ELECTRICAL REVIEW

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VIEWS, NEWS AND INTERVIEWS.

Chief Engineer Walter M. McFarland, U. S. N., who recently resigned from the navy to become assistant manager of the Westinghouse Electric and Manufacturing Company, received a few days ago pleasant evidence of the esteem in which he is held by his fellow officers in the service. The Engineer Corps of the navy, through Engineer-in-Chief Melville, presented to Mr. McFarland a silver loving cup inscribed with his name and the following sentiment proposed by Commodore Melville: "Drink deep the draught of love, the love of your fellowmen." The presentation took place in Commodore Melville's apartments in Washington, D. C., and all the naval engineers on duty in that city, as well as a number of Mr. McFarland's other friends, were present.

If an American wishes to stigmatize the untruthfulness of a fellow citizen as something absolutely colossal, he is apt to explain that the individual in question "lies like a gas meter," says London *Lightning*. Gas company officials have been known to deny indignantly the anything but soft impeachment suggested by the allusion, but a case recently reported in the daily press should make them "lay low and keep on sayin' nuffin'," like Brer Fox and the Tar Baby in "Uncle Remus." The meter which adorns the tale was planted presumably by the gas company on premises occupied by Mr. Dunbar, Assistant Under-Secretary for Scotland. At the end of six months the automatic liar accused the gentleman of having burned a small matter of 80,000 feet of gas. Mr. Dunbar protested indignantly, but the company took the matter with great calmness, ignoring his assertion that he couldn't have consumed the amount. If he had been charged with twice the whole output of the gasworks, the company would no doubt have been equally placid and persistent. In due course, and in default of payment, they issued process and awaited further developments. Upon this Mr. Dunbar wisely submitted the incriminated instrument to an expert, who reported that it registered exactly nine times the amount of gas actually consumed. At this stage of the proceedings a gleam of reason seems for the first time to have entered the brains of the gas officials, for they meekly abandoned their action and paid Mr. Dunbar's expenses!

One of the most important questions to the engineer, as we all know, says an exchange, is that of paint, and numerous experiments have been made and are constantly in progress for determining the enduring and preservative qualities of the various paints in use. The Western Society of Engineers have on exhibition at their rooms in Chicago a station sign from Harper's Ferry, Va., which seems to have beaten the record for paint endurance. Thirty years, it is said, have not dimmed the luster of the letters, while the wood around them has been worn away about a sixteenth of an inch. The address of the painter or his secret of compounding the paint is now much desired.

A recent paragraph quoted by the ELECTRICAL REVIEW from the Boston *Globe* asserting that Boston was one of the best lighted cities in the world, and stating that St. Louis has 660 electric lights per 1,000 inhabitants, has been challenged by the *Electrical Era*, of St. Louis. Figuring on the basis of a population of 630,000, Mr. A. J. O'Reilly, Supervisor of Street Lighting of St. Louis, furnishes to the paper named figures showing that the number of lamps in that city per 1,000 population is 12.3. These figures refer to alley and street lighting. It is probable that the Boston *Globe* was referring to the total number of electric lights, both public and private, which point seems to have been missed by the St. Louis paper named.

There is a great desire in Wall street to see a compressed-air "auto-truck."

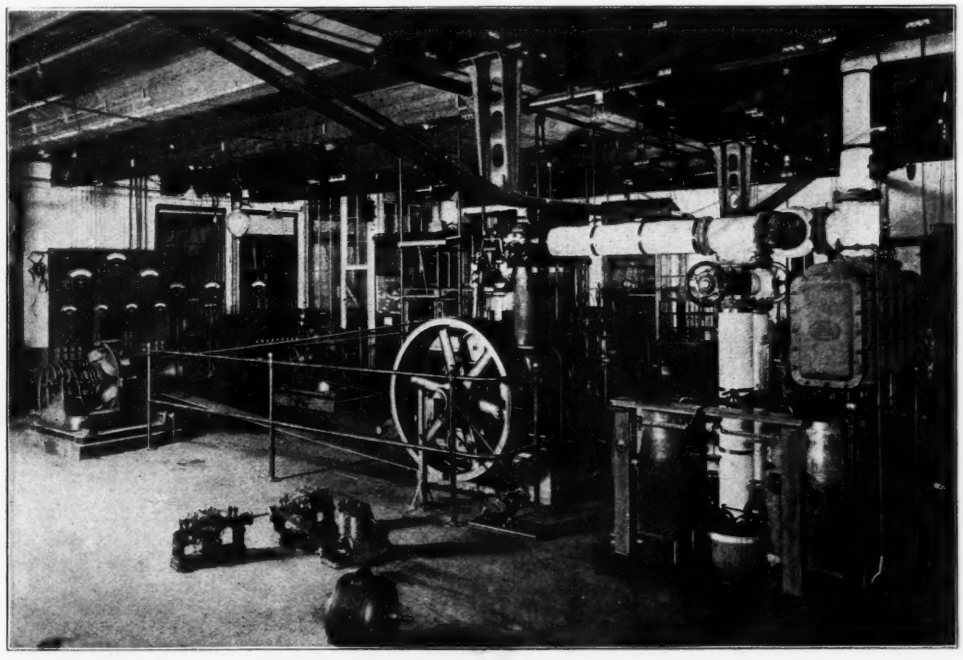

FIG. 1.—EXPERIMENTAL PLANT IN THE LABORATORY OF ELECTRICAL ENGINEERING AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY, BOSTON.

Electrical Engineering at the Massachusetts Institute of Technology, Boston, Mass.

In the Summer of 1882 the corporation of the Massachusetts Institute of Technology, at Boston, formally announced the establishment of a course in electrical engineering. Previous to this, however, and as early as 1876, a course of lectures and laboratory practice relative to the technical uses of electricity in telegraphy, telephony and electric lighting had been instituted. The new and separate course was decided upon so as to offer students the opportunity of pursuing a systematic series of studies which should fit them to enter upon the then new profession of electrical engineering. At that time there was no opportunity for any thorough and consecutive study of this subject to be found in the United States, and but very little elsewhere.

In September, 1882, work in the electrical engineering course was begun, and in 1885 the first class was graduated. The total number of graduates in electrical engineering, including the college year of 1897–98, is 352. The course is intended to meet the needs of young men intending to enter upon the practice of the various applications of electricity in the arts.

The course aims to train electrical engineers—not mere electricians. The original plan recognized the principle afterwards so forcibly stated by Lord Kelvin, that electrical engineers "must, before all, be engineers; they must be engineers, and they must learn electricity." As a means to this important end a student spends a large portion of his time in the laboratories and lecture-rooms of the departments of mechanical engineering and applied mechanics. Shop work, the principles of mechanism, mechanics, strength of materials, thermodynamics and steam

engineering are all recognized as forming an essential part of the future engineer's professional work.

Almost from the time the student chooses his course his work is differentiated from that of the student in mechanical engineering. In the second year he receives special instruction in acoustics and electricity and also begins work in the physical laboratory. In the third year he takes up a course in theoretical electricity and methods of telegraphy, the construction and uses of electrical measuring instruments and special work in the physical laboratory. In the last year of his course the greater portion of his time is spent upon technical electrical studies.

Realizing that no electrical engineer can be considered as properly educated without a good knowledge of mathematics and its application to electrical subjects, special attention has been paid to this important matter in laying out the course in electrical engineering. It is borne in mind at the same time that one may be a competent engineer without any very exceptional mathematical ability; therefore the work in pure mathematics is terminated with the subject of differential equations. Students who are competent are thus sufficiently trained to pursue the higher courses in mathematics as they desire.

As with all the 13 separate and distinct courses at the Massachusetts Institute of Technology, the course in electrical engineering is designed to give the student a broad and generous training which shall fit him to consider intelligently any of the various questions which may be presented to him as a scientific man or as a citizen. He is taught first of all to be accurate in his observations and logical in his deductions from them, and he is trained in such habits of thought that he may be able at any time to concentrate the whole of his knowledge upon the subject immediately in hand.

English literature and composition, business law, history, political economy, French and German are studied for their professional value as well as to give a broad and general training. The endeavor is always made to discipline the mind and eye and hand rather than merely to teach special processes or to impart particular facts. Sound judgment and the ability to solve new problems as they arise are felt to be more important than memorized information, however accurate.

The work in physics and electricity is carried on in the Rogers laboratory of physics, which comprises 16 rooms, the largest of which has a seating capacity for 340 students. Both alternating and direct current are supplied from the dynamo-room in the building, and connection is made with the street mains of the Edison Electric Illuminating Company. Much of the apparatus in the physical laboratory is duplicated, often several times, giving the student an opportunity to become familiar with the construction of instruments by various makers. The collection of physical apparatus representing the Swiss, German and English makers is especially complete. The laboratory for electrical measurements is furnished with special circuits for lighting and power and for both direct and alternating currents. It contains in great variety the principal types of apparatus for accurate measurements of all electrical quantities. A specially designed Wheatstone bridge is reserved solely for the purpose of standardization and verification of resistances. The standard ohms used are of English and German manufacture properly verified. Much of the apparatus in this laboratory is original in design. The laboratory of electrical engineering contains two distinct power plants driven by two steam engines of 100 horse-power and 130 horse-power respectively. Both plants are primarily intended and arranged for purposes of instruction. The plants include a large number of dynamo machines, both alternating and direct, of various types and sizes. These two plants are probably the most complete possessed by any technical college in the United States. There are two photometric rooms, laboratories for heat measurements, physical chemistry and acoustics, optical and photography rooms, and a very complete physical library, containing about 6,000 volumes and 1,000 pamphlets. There are also laboratories for testing the strength of materials, experiments in hydraulics and steam, besides very complete workshops in separate buildings, where carpentering, wood-turning, pattern-making, foundry work, forging and machine-shop practice are studied practically.

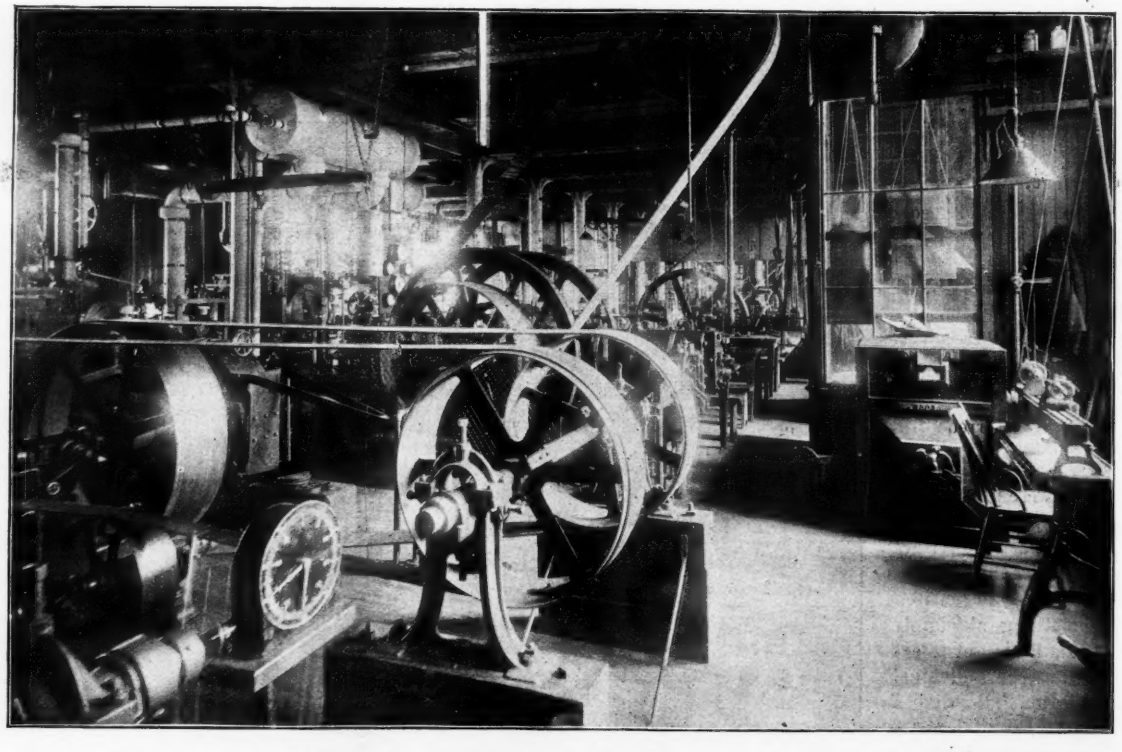

FIG. 2.—LABORATORY OF STEAM ENGINEERING, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, BOSTON, MASS.

Professor Charles R. Cross, director of the Rogers Laboratory, is in charge of the course in electrical engineering, and Professor Silas W. Holman, is emeritus professor of physics The rest of the staff is composed of four assistant professors, six instructors, four assistants and a mechanician. Special lectures by prominent engineers in the various fields of the electrical industry are given every year.

Boston Edison Dividend.

The Edison Illuminating Company of Boston has declared a quarterly dividend of two per cent, payable February 1, to stockholders of record January 18. Books closed January 18 and reopen February 2.

Electrical Stocks.

The week just closed was one of the most active in the history of the Stock Exchange. On Friday all prior records of activity were broken, over 1,200,000 shares of stock having been dealt in. The dealings to-day were also very active, and, counting Saturday as a half day the daily average for the week was in excess of 1,000,000 shares. The number of issues dealt in was 224, and the bond transactions amounted to the extraordinary total of $37,286,000 par value. The number of bond issues dealt in was 268. As compared with the final prices of last Saturday the majority of the list closed higher to-day.

On the New York Stock Exchange General Electric closed at 102 bid and 102⅛ asked. Edison Electric Illuminating of New York closed at 199 and no bid price. On the Boston Exchange American Bell Telephone closed at 305 bid and 305⅛ asked. Erie Telephone closed at 89 bid and 90 asked. On the Philadelphia Exchange Electric Storage Battery common closed at 64 bid and 64⅜ asked. Electric Vehicle closed at 25 bid and 26 asked.

Wall Street, January 21, 1899.

National Association of Manufacturers.

The National Association of Manufacturers of the United States of America holds its fourth annual convention at Cincinnati on January 24, 25 and 26.

NORTHWESTERN ELECTRICAL ASSOCIATION.

Seventh Annual Convention Held at Milwaukee.

A GOOD ATTENDANCE AT THE MEETING LAST WEDNESDAY, THURSDAY AND FRIDAY—A REPORT OF THE PROCEEDINGS—PAPERS READ AND DISCUSSED—NOTES OF THE EXHIBITS—THE ATTENDANCE—NEW OFFICERS.

WEDNESDAY, JANUARY 18.

The seventh annual convention of the Northwestern Electrical Association was called to order by President F. A. Copeland, of La Crosse, Wis., at 12.10 P. M., on January 18, in the club room of the Hotel Pfister, at Milwaukee, Wis. The official programme was announced and the calling of the roll was dispensed with. The minutes of the previous meeting, as printed in the report of the last annual convention, were adopted unanimously.

The reading of the president's address was deferred until the opening of the afternoon session. The secretary and treasurer presented his annual report, which was unanimously adopted as read. Over 40 members registered at the opening session.

The secretary called attention to the arrangements for the theater party and the lecture at Plymouth Church, both to be held in the evening. The secretary also announced that, after six years' growth, the Northwestern Electrical Association now had the largest membership of any electrical association in the country. This statement was greeted with applause.

The question box was then taken up and questions presented as follows:

1. What is the best way to enlarge the arc, incandescent and motor capacity of a plant that is now "filled up" in all departments?
2. For a plant in a small city, no day circuit, services to midnight only, what method of charging for lights would give best satisfaction to company and consumer?
3. Which of following methods would give best satisfaction in supplying lamps?

(*a*) Plant to furnish lamps free and change them when burned dim?

(*b*) Plant to charge for first lamp, renewals free, customer pays breakage?

(*c*) Plant to sell lamps at cost, no free renewals?

(*d*) Customer to buy lamps in open market, plant having no say as to make?

Twenty-four applications for membership were presented.

FIG. 3.—LABORATORY OF GENERAL PHYSICS, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, BOSTON.

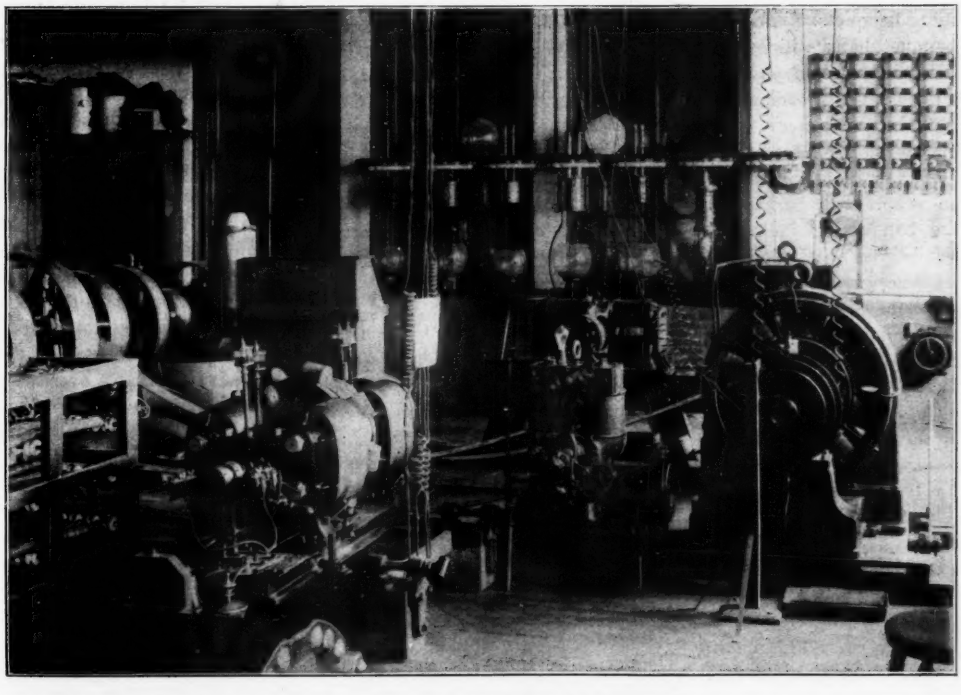

FIG. 4.—GROUP OF DYNAMOS IN LABORATORY OF ELECTRICAL ENGINEERING, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, BOSTON.

Mr. Doherty, in the course of remarks on the question box, spoke in part as follows:

In regard to the first question, "What is the best way to enlarge the arc, incandescent and motor capacity of a plant that is now filled up in all departments?" it looks as if the only answer to that question was, to build a new plant. But a great many interesting points might be brought out in that question. For instance, if the station was filled up in every department, yet the managers might not have the money, or feel that it was advisable to put in a complete new plant, new arc machines, new alternators, and might want to make an increase in one line this year and in another line the next. There are a dozen different ways of doing that—putting arc lamps on the transformers around the station, cutting them in and out with knife-blade switches, etc. I do not think that there is an automatic switch now on the market for alternating currents, but one is expected soon. There is a switch for the direct current working by clockwork, throwing lights on and off, on circuits like the Edison, and where they do not use series lamps. I would not undertake to answer that question for one moment, but I suggest that an alternator, with reserve capacity for future needs, to be put in that would enable them to lighten up the load on the arc machine and take on more lamps. Then they could transfer service back and forth, between one department and another, and in that way save considerable on the enlargement of the plant.

Mr. Schott and Mr. Livermore also spoke to the question.

(*Continued on page 58.*)

Use of Trolley Currents in Buildings.

TO THE EDITOR OF ELECTRICAL REVIEW:

In the ELECTRICAL REVIEW of January 18 I notice your editorial upon the danger from the use of currents taken from trolley circuits in business houses, and in this connection want to call your attention to my three patents, Nos. 426,127, 473,932, 545,296, in which I have protected broadly the following features:

1. Absolute safety in the transmission of alternating currents of very high potential by generating the currents at low voltage and in large quantity, carrying said currents below ground and converting them into high potential and smaller quantity, and conveying them thence by concentric conductors to outlying points, still below ground, where they are again converted into low-potential currents of great quantity for use as desired.

2. The rendering of an electric system absolutely safe from dangerous shocks by my system of concentric conductors, the inner conductor of which is always removable and accessible.

3. The connecting of the exterior conductor always to earth, so as to avoid dangerous shocks and protect the system from lightning.

4. The doing away with approximately 50 per cent of the wiring usually used in buildings.

5. Absolute safety from fire by reason of the fact that no short-circuits can occur, otherwise than internally in the system.

6. The utilizing of a minimum number of safety fuses.

7. The construction of the system in such manner that all portions thereof are easily accessible, so that the interior conductor can be removed at all times and repairs effected.

8. Simultaneously maintaining the system free from moisture by circulating air through the conduit pipe and utilizing the same for ventilating purposes in the building.

9. The avoidance of induction on all parallel or adjacent circuits.

10. The avoidance of danger from cross-circuits with other conductors.

In this connection I want to call your attention also to the London *Electrician* of December 16, 1898, wherein the question of concentric wiring is discussed, and particularly with relation to the very question under consideration; namely, safety conveyance of current potentials of from 200 to 250 volts pressure or more.

I am satisfied that it is only a question of time when concentric wiring will become universal, particularly if currents are to be taken from trolley circuits in street mains.

My system makes it possible to apply the concentric conductors directly to the existing street mains and maintain absolute security against fire and dangerous shocks in buildings where such currents are used. It also makes it decidedly more available than the European system of concentric conductors, in which said conductors take the form of a lead-covered cable, the outer or lead covering constituting the return circuit. Such a concentric conductor is open to the objection that if any damage occurs the entire conductor must be taken up to find it, while with my system the inner conductor being always removable makes it possible to have access to it at all times, and the outer conductor is always permanently located.

I am, yours truly,

C. J. KINTNER.

New York, January 18, 1899.

Banquet Speeches by Telephone.

The local societies of the Massachusetts Institute of Technology, of Chicago, Boston, New York, Philadelphia and St. Louis, will hold their annual banquets on the night of February 3, and only one toastmaster will be required to preside over the five different banquets. The five different banquet halls will be connected by long distance telephones so as to make it possible for each society to participate in the other's enjoyment. Speeches from Governor Roosevelt, of New York, Thomas A. Edison and others will be heard in each of the banqueting halls. At each plate, besides the regulation number of wine glasses and knives and forks, will be placed a telephone receiver, and immediately after the punch has been served, the diners, by holding the instrument to their ears, will listen to after-dinner speeches hundreds of miles away.

OBITUARY.

Gen. Selden E. Marvin, of Albany, N. Y., president of the Hudson River Telephone Company and a member of the State Board of Charities, died on January 19 after a lingering illness. He was for many years prominently connected with the iron industry in Albany, being associated with his brother-in-law, the late Erastus Corning. He served in the War of the Rebellion, and made a notable record for gallantry. He was one of Albany's leading citizens, and was widely interested in charities.

The Rubber Industry of Brazil and Peru.

The production of rubber has of late increased in the districts of the lower Amazon, but it is worthy of notice that in the upper portion of the country, watered by numerous rivers that have their sources in the adjoining countries of Bolivia and Peru, the production of rubber is also developing each year. In fact, it is in the upper region of the great navigable rivers (Purus, Madeira, Jurua, Javary, Solimoes and Rio Negro) that the rubber is collected which is sent to the market at Manaos, at the confluence of the Rio Negro and the Amazon, and it is to be remarked that the country watered by these streams is situated for the greater part in Bolivia, Peru, Venezuela, and even in the Guianas. In 1896 the production of rubber in these different regions was as follows:

	Tons.
Purus	3,934
Madeira	2,285
Jurua	2,031
Javary	1,406
Solimoes	804
Rio Negro	483

If to these figures is added 1,504 tons of "cachoe," the total product of this region will be 12,530 tons of gum, 6,599 tons of which are sent from Manaos to Para, and 5,931 tons direct to Para. During the two preceding years the production rose, respectively, to 10,614 and 11,729 tons. According to the Lima *Economista*, the production varies considerably in different localities, and depends on the height of the water in the large rivers. For example, it is sufficient to mention the quantities received in the Purus district during the various months of 1896:

	Tons.
January	1,213
February	961
March	106
April	90
May	15
June	3
July	112
August	297
September	323
October	274
November	201
December	300

The total exports of rubber from the ports of Manaos and Para were as follows during the last eight years.

	Kilograms.
1896	21,601,874
1895	20,769,581
1894	19,473,688
1893	19,130,199
1892	18,509,182
1891	17,783,405
1890	16,393,821
1889	15,886,777

(Of this quantity the United States imported the larger portion, except in 1896.)

In 1896 the part taken in the business by the various exporters of Para was as follows:

	Kilograms.
Pusinelli, Prusse & Co.	6,298,773
Adalbert K. Alden	4,127,431
La Rocque da Costa & Co.	2,176,497
Rud. Rietz	2,149,696
Witt & Co	1,226,970
R. F. Sears & Co	895,840
Senglehurst, Brocklehurst & Co.	630,291
Deni Crouan & Co.	483,612
B. A. Autunes & Co.	454,798
J. H. Andreesen	363,071
Marius & Levy	362,585
Kahn, Polack & Co.	166,052
Pireo, Texeira & Co.	128,285
A. Fernandez & Co.	126,562
A. Berneaud & Co.	79,225
Freitas Sobrinhos & Co.	75,727
Edmund Reeks	44,888
P. Mouraille & Hermano	33,921
Luis Schil & Sobrinos	22,878
R. Wall	17,057
From the port of Serpa	4,279
From Iquitos	252,383
Various small exporters	978,371

The Carbon Question.

Mr. W. H. Lawrence, of Cleveland, who is to be the president of the recently organized National Carbon Company, of New Jersey, when asked about the policy of the company, replied that it would be the aim of the company to produce the best quality of carbons possible and sell them to consumers at the lowest price commensurate with a fair manufacturers' profit; that, owing to the recent improvements and developments, he believed this could be done with but a slight advance, if any, over the present prices, by reason of the advantages, from a manufacturing standpoint, gained by increasing the output of the larger and more perfectly equipped factories; that while the raw material at the present day is considerably higher that it was 10 years ago, when the selling price was twice as high owing to the great improvements in machinery and processes of manufacture, the reduction in price had been but little more than the reduction in cost of manufacture. He stated further that he was opposed to any radical change or advance, and that under no circumstances would he have accepted the presidency had such a policy been in contemplation.

ROENTGEN LIGHT NOTES.

BY WILLIAM ROLLINS.

NOTE XLII—ON GENERATOR TERMINALS IN OIL.

Soon after Roentgen's discovery was announced, Professor Trowbridge cooled the discharge tube by oil. Mr. Tesla developed the method and published a figure of the apparatus. Like most of the early work it has been lost, because the great experimenters will not take the time to say the same thing over and over. While using this method I noticed a phenomenon new to me. As I can not find it mentioned it is here described. At the anode end of the tube the oil fairly boiled, not in temperature but in appearance, the surface being raised and in constant motion. This was striking, for no bubbles were formed. At the cathode end there was less disturbance, though a match appeared alive, darting to the terminal and rushing back again, repeating the motion at short intervals. When the tube was removed and the terminals placed 15 inches apart the phenomena were very marked, the surface of the oil near the anode being raised a quarter of an inch. We had here in the liquid dielectric a similar process to what takes place in air; in other words, a liquid brush discharge.

NOTE XLIII—BURNING FROM ROENTGEN TUBES.

In Note 12 I showed that a severe burn could be produced by a tube giving no Roentgen light, the pressure being so low that, with the potential used, no discharge went through the tube. In this case, therefore, the burning was due to the electric discharge and not to Roentgen light. On the other hand I stated that prolonged exposure to the discharges from a vacuum tube did not burn me because I used a Tesla screen. I also tried the experiment in another way. The vacuum was made so high that the greater proportion of the Roentgen light was of short-wave length, what is commonly known as penetrating X rays. Using the same screen I could not burn myself. I then arranged the apparatus so that the radiation consisted chiefly of short waves, what is known as least penetrating X rays. I could not, with exposures of hours in a several day investigation, produce any effect with the screen to protect me. Now, as Roentgen rays are short ether vibrations, whose length depends upon the temperature to which the particles of the cathode discharge are raised by their impact on the target, we should not expect them to produce much more severe burns than sunlight, also an ether wave phenomenon; the chief difference, except in amount, being that in addition to the rays present in sunlight when it reaches us a tube gives off radiations of higher pitch. Prof. E. Thomson has said that the sun probably gives these short vibrations also, and Madame Curie, in attempting to reach the shore of that mysterious ocean of power from which evermore uranium and thorium draw force, started with the idea that all space is filled with more subtile radiations than those of Roentgen. Elster and Geitel doubt this, because carrying these metals to the bottom of a mine 3,000 feet below the surface did not affect them. To me this objection is without force, because I had previously stated in these notes that we could produce a vibration to which worlds would be transparent, the Roentgen rays being but an octave in the grand gamut. An eminent authority has stated, and repeated his statement, that burns are due to X rays of low penetrating power, which are most stopped by the tissues, and that a sheet of suitable material, in other words a Tesla screen, may prevent burns by stopping these waves. I, of course, do not know enough to criticize this view, but mention some facts which should be considered by those who hold it. I have always used a Tesla screen of wire netting, through whose open meshes all rays pass freely. This construction has been made necessary by the imperative need of being able to safely watch for hours the tubes with which I was experimenting. Moreover, the less penetrating rays are most stopped by bones, which on this theory should be affected.

NOTE XLIV—ON HYDROGEN AND OXYGEN.

In this journal for December 1, 1897, a tube was figured with an hydrogen vacuum, and in the number for February 9, 1898, one with an oxygen vacuum. As the latter type of vacuum is perhaps being made unduly prominent, the matter will bear speaking of again. When we wish to make most of the light of short waves use hydrogen, because the same electro-motive force causes its particles to strike the target at a higher velocity, and therefore they are raised to a higher temperature, producing more short waves. In this case the target should be of the most dense metal, because, as stated in Note XXXV, the shock of impact is more sudden, the heat in consequence reaching a higher degree. To generate light of mostly longer waves use oxygen, which, being heavier, strikes the target with less velocity when the electro-motive force is the same. The particles are therefore not raised to so high a temperature, the waves being in consequence longer. Oxygen has one advantage for a tube with an uncooled target—it does not disappear so rapidly, the vacuum requiring less frequent adjustment. These statements apply to the ordinary types of commercial apparatus. With generators of moderate electro-motive force, large amperage and enormous frequency, other considerations come in.

NOTE XLV—ON HARMONICS.

After reading the notes published in this journal it is desirable to add a few words on some points already touched upon. The wave length of the Roentgen light was said to depend upon the velocity with which the particles struck the target and upon the temperature to which they were raised by the force of impact. As these particles are small the heat declines rapidly, the train of waves being short, the length of the waves increasing as the heat declines. It was also stated that the amount of Roentgen light depended upon the amperage utilized at the target, and as this is not the same as saying that to increase the light it is only necessary to increase the amperage, I dwelt at some length upon the necessity of harmony between the tube and generator, a matter which each new day of experience showed to be of prime importance. For example, it is possible to use the entire output of my large Holtz machine, probably the most powerful of its type in America, and not get as much light from a tube as when it is excited by a very small machine of the same type. I do not believe that any electrician but Mr. Tesla realizes the imperative necessity for harmonics, if we wish to economically convert a long into a short vibration, and it appears to me that the remarkable photographs he has shown in this journal of electricity converted into light are due to his recognition of this principle.

The poets are the true seers, and the discoverers whose minds are most like theirs are those who first catch glimpses of remotest laws. I have already quoted Emerson as saying "the atoms march in tune," and again refer to this as showing the necessity of adjusting the apparatus so that the discharges from the concave terminal shall follow each other in regular order, and at periods which are harmonics of the wave length of the Roentgen light we wish to generate by the impact of these discharges on the target. Only in this way can we get the most light with the least amperage. Trowbridge has shown that an apparently single surge is composed of a multitude. We must adjust the rate of these, for so simple a thing as changing the condenser discharge with a static machine will make the difference between a well or badly lighted tube.

Accumulators on Board Ships.

We note a well written article in the ELECTRICAL REVIEW, of New York, on the use of storage batteries at sea, and, while quite agreeing that in the situations premised, accumulators would do good service, we do not think they can be recommended for ship work. The author, in the first place, refers to the greatly increasing use of electric motors on ships instead of auxiliary engines, and says that there is a Russian man-of-war building at Cramp's shipyard on which electric motors will be employed throughout to the exclusion of the auxiliary steam engine. He then considers the risks of breakdowns, but does not say that these risks can be minimized by having distinct plants, working duplicate circuits, running to every part of the ship. He proposes to install accumulators of sufficient capacity to operate the searchlights, the turrets and ammunition-hoisting motors, and about 100 incandescent lamps for five hours steadily, but he does not work out the dimensions and weight of such a battery. In conclusion, he adds that "the maintenance of the batteries is small, and they have reached a state when they can readily be operated by the ordinary marine engineer." This is too much to pass unnoticed, as the maintenance of the type of cells required for service on a ship is heavy and their life none too long. In fact, a ship would be better to have more spare steam plant than to carry the dead weight of such a large battery of accumulators.—*London Electrical Engineer.*

Police Telegraph Apparatus Wanted.

Sealed proposals will be received by the City Clerk of the city of Los Angeles, Cal., until 11 o'clock A. M. of February 20, 1899, to furnish for the use of the police department 50 police signal boxes, one central office outfit, storage battery and switchboards, in accordance with specifications for such apparatus on file in the office of the City Clerk.

Electrical Review

[OLDEST ELECTRICAL WEEKLY IN THE UNITED STATES.]

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SPECIAL NOTICE TO ADVERTISERS.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue. NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

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We advise the Adams Express Company to promptly adopt electric delivery wagons and intelligent men to run them. A package with perishable contents was shipped from Connecticut a short time ago to a name, street and number in Brooklyn, the name and street very clearly written, the number being incorrectly given, but to a residence in the same block and on the same side of the street. The goods were held one week by the express company and then delivered to the right number in a condition which could give aromatic points to the embalmed beef discovered by General Miles in Cuba and Porto Rico. We should think a company of the caliber of the Adams Express would have men in charge of its city offices intelligent enough to look at one of several city or telephone directories or make some sensible effort to deliver goods promptly.

The general public in and around New York city is just as much as ever, if not more, interested in electrical progress. Bearing this in mind, it seems to us that the National Electric Light Association, as a prominent and influential organization with which the people are familiar, and the Electrical Exhibition Company, which proposes to hold an electrical exposition in the Madison Square Garden next Spring, should combine their forces and influence to produce the very best possible setting forth of all that is latest and best in electrical development. It is to be hoped that electrical manufacturers will do all in their power to make the forthcoming exhibition a representative and instructive one.

Mr. Russel Sage was quoted last week as denying the published report saying that President Gould and Vice-President Gallaway are opposing the substitution of electricity for steam-power on the Manhattan Railway of New York city while he was advocating the change. Mr. Sage denied that there was any friction, and stated that all the gentlemen named were working in harmony. Mr. Sage also intimated that he was not yet satisfied that the elevated railroads of New York city could save money by installing electric power. He also denied that he was selling any of his stock in the Manhattan Railway Company. The gist of the matter seems to be that electricity is no nearer being used on the New York elevated railroads than it was five years ago.

THE END OF KEELY.

Beginning probably with the celebrated "Mississippi scheme" of John Law about 1718, the world has, in the last two centuries, submitted to some gigantic frauds and the people have put their money on the more or less masterly shell-games by millions. The bubbles have burst, and generally within a comparatively short space of time. But it remained for Keely to break the great record, for he fooled his dupes for almost a quarter of a century, and longer, for some of them really appear yet to believe in his motor.

It is a wonderful record, all the more so that the fraud was perpetrated on and really believed in by many men of superior intelligence, and by some who had more or less scientific and mechanical training. In the old palmy days of Keely, many a man of cautious and mature judgment, on witnessing the so-called manifestations of the "etheric force" of the great charlatan, would shake his head in perplexity and admit he was at a loss to controvert the apparent facts. And often such a man would ponder over the possibilities of such a new engine and wind up his cogitations by drawing his check and buying Keely stock. The fraud was too attractive for him and for many others.

Keely had a motor, however, and it was for years in successful operation; the world saw it, applauded, came forward and became itself the medium of the successful operation. The records show this. But this successful motor was only adapted for one kind of work, which was the transferring of hard-earned dollars from the pockets of the dupes to that of Keely. In that respect there was a very real Keely motor, but its operation was unobserved of all. Lubrication was perfect, not a bearing squeaked. Balance was admirable, not a chatter could be heard. Yet the machine was in motion for years, but its operation was so shrewdly directed and controlled, that it went along for 25 years almost unceasingly, abstracting millions of dollars from the pockets of the dear public and unfailingly putting them all snugly into the pockets belonging to the master-hand at the throttle. All the suavity and shrewdness and experience of all the bunco steerers in the country rolled into one could not approach such a success as this extraordinary individual conceived and executed in the teeth of all the experts of the world. Surely, history has no parallel to this. But Keely is dead, his laboratory has been dismantled, and his secret and fraud unearthed. It looks now as if the committee had done its work thoroughly and laid the ghost forever.

The Autotruck Company, of New York city, is apparently doing a lively business in the selling of its shares, but who has seen an actual truck anywhere about the city loaded with "ten tons" of merchandise? Who ever will see a truck full of goods to the extent of ten tons tearing along our streets at a rate of ten miles per hour? What street would stand it? But while streets could not stand under such burdens, the public will stand anything in the way of promises. It is a life of hope we live, truly.

The Northwestern Electrical Association held a very successful annual convention at Milwaukee last week. The papers read before the delegates were interesting, and the discussions following were profitable. During the meeting the announcement was made that the Northwestern Electrical Association has a larger membership than any other similar organization in the United States. In view of the fact that the association represents the comparatively smaller central stations within its jurisdiction, this is an encouraging sign of the times. The "big fellows" are rather expected to look out for their own interests, and their brethren are fortunate in having so energetic and progressive an association as the Northwestern to take care of their side of the case. For a young organization, the Northwestern Electrical Association is a vigorous and influential power for good. The ELECTRICAL REVIEW trusts it has many years of usefulness before it.

ELECTRIC LIGHTING COMBINATION IN NEW YORK CITY.

EDISON AND OTHER NEW YORK COMPANIES ACQUIRED BY THE WHITNEY SYNDICATE.

Arrangements were completed last week under which the Edison Electric Illuminating Company of New York will be acquired by the New York Gas and Electric Light, Heat and Power Company. This is the company which was recently incorporated with $25,000,000 capital by the Hon. William C. Whitney and his friends. A circular has been sent to the stockholders of the Edison company, signed by Spencer Trask & Company, Vermilye & Company and the Central Trust Company, stating that Mr. George Foster Peabody, representing the principal stockholders of the Edison company, has entered into an agreement with the State Trust Company for the sale of the Edison stock represented by him, the agreement to be binding only in case the holders of at least 55 per cent of the stock shall have agreed to the sale by February 15, with an allowance of 10 days more to stockholders living abroad. The price to be paid for the stock is 220, payable in 50-year four per cent purchase-money gold bonds of the New York Gas and Electric Light, Heat and Power Company at par. The latter company is to have the right to pay off the bonds at par and accrued interest, at any time within three years from February 1, 1899. The issue of bonds is to be limited to $21,000,000. They are to be secured by a purchase-money mortgage which will be a first lien on the Edison shares, and by the deposit of $4,000,000 in cash with the trustee. The new bonds are also secured by a second mortgage upon the property and franchises of the power company, subject to a first mortgage securing $15,000,000 of bonds, of which $11,500,000 are now outstanding.

Spencer Trask is the president of the Edison company, and is also at the head of the banking firm mentioned. It was reported last week that R. R. Bowker, first vice-president of the Edison company, was opposed to the negotiations for the transfer and has resigned his position. It was also said that Mr. Bowker would resign the presidency of the Manhattan Electric Light Company, which is controlled by the Edison company. Mr. Whitney and his associates have already secured control of the Mount Morris Electric Light Company, of New York, and the subways controlled by the Empire Subway Company. It was also reported that the control of the United Electric Light and Power Company, and the Block Electric Light and Power Company, has been acquired by the New York Gas and Electric Light, Heat and Power Company.

The Beacon Lamp Company Fails.

A petition in involuntary bankruptcy has been filed against the Beacon Lamp Company, of New Brunswick, N. J., by a creditor for $500. The liabilities are said to be about $200,000.

Colonel Griffin Named for Brigadier.

President McKinley on Monday nominated Col. Eugene Griffin, First Volunteer Engineers, to be brigadier-general. General Griffin is first vice-president of the General Electric Company.

PERSONAL.

Mr. E. B. Baker, general superintendent of the Southern New England Telephone Company, came into the Metropolis from New Haven last week and distributed a few telephone "tokens" to his friends.

Captain and Mrs. W. L. Candee returned from Europe on the "Servia" on Tuesday of last week. They had been abroad about a month, the affairs of the Okonite Company requiring Mr. Candee's presence in London at the close of the year.

Mr. W. R. Mason, well known in electrical circles, has been appointed sales agent of the Siemens-Halske Electric Company, and will, for the present, have his offices in the Security Building, St. Louis, Mo. Mr. Mason has a wide acquaintance among the electrical fraternity, and is undoubtedly a valuable addition to the active staff of the Siemens & Halske Electric Company.

Mr. A. M. Young, president of the National Electric Light Association, sailed for Europe last week to meet his daughters, who have been spending the Fall and Winter abroad, and will return with them about February 1. Before sailing Mr. Young stated that the affairs of the Electric Light Association were in good shape, and he anticipated an important and well-attended meeting here in May next.

Mr. W. H. Lawrence, president of the National Carbon Company, entered the electrical field in 1874, when he became a large stockholder in the Telegraph Supply Company. He retained his interests through the company's various changes until it was finally merged into the Brush Electric Company. Mr. Lawrence was associated with Charles F. Brush in the early days, and furnished a large portion of the original investment in the Brush Electric Company.

Meeting of the National Electric Association and Insulated Wire Manufacturers.

A meeting was held in Chicago last week at the office of W. H. Merrill, electrician of the Electrical Bureau of the National Board of Fire Underwriters, that was largely attended by the manufacturers of rubber-covered wire. The question of insulation thickness was discussed and a very satisfactory conclusion reached. The following wire companies were represented by the gentlemen named:

American Electrical Works by Messrs. Remington and Donohue.

Bishop Gutta-Percha Company by Mr. H. D. Reed.

Eastern Electric Cable Company by Mr. Eustis.

Simplex Electric Company by Messrs. Mason and Hixson.

Canadian General Electric Company by Mr. Watts.

John A. Roebling's Sons Company by Messrs. Neubery and Sewell.

Washburn & Moen Company by Messrs. Pietzeker and Smith.

Crefeld Electrical Works by Messrs. Lockwood and Bibber.

New York Insulated Wire Company by R. E. Gallaher.

Safety Insulated Wire and Cable Company by Messrs. Clark and Austin.

Indiana Rubber and Insulated Wire Company by Messrs Lucas and Lowe.

W. R. Brixey (Kerite) by Geo. F. Porter.

Okonite Company, Limited, by Messrs. Manson and McKinlock.

National India Rubber Company by Mr. Hodgkinson.

General Electric Company by W. L. Clark.

Standard Underground Cable Company by Mr. Connot.

Crescent Insulated Wire and Cable Company by Mr. Murray.

Phillips Insulated Wire Company by letter.

Alfred F. Moore by letter.

"Electricity on Board Ship."

The American Institute of Electrical Engineers will meet this (Wednesday) evening at 8 o'clock P. M. at 12 West Thirty-first street, New York, to listen to an address by Lieut. S. Dana Greene, entitled "Electricity on Board Ship." Lieutenant Greene was one of the officers of the "Yankee" during the Spanish-American War, and his lecture will be of special interest at this time.

An Inquiry Concerning Keely's Air Pipes.

TO THE EDITOR OF ELECTRICAL REVIEW:

I am no believer that Keely ever had anything real or that his motor was anything but a wonderfully clever trick. Nor do I believe in any such rubbish as the old saw, "*De mortuis nil nisi bonum.*" But it strikes me the discoverers who have dug up the floors of the old Keely shop have not quite redeemed their reputations for high-class work. A lot of pipes were found, all with thick walls and small bore, such as would be required for air or gas under high pressure. At once the conclusion was announced that the great mystery was no mystery, only a mere transmission of power by air or gas under extreme high pressure, and that it was easy enough for any one to connect the generator with the motor by a single wire-like tube and produce motion and manifest power.

But it seems to me that is an insufficient explanation. Air or gas under pressure of 1,000 or 2,000 pounds per square inch pressure could carry a lot of energy in a small pipe; but the energy could only be released into motion by allowing the air to expand in producing such motion. Such expanded air must have an outlet from the machinery to the atmosphere, unless a return pipe of very much larger bore carries it back to the compressor.

Keely could, of course, easily have had a portable hand compressor capable of packing into a satchel, and as his rule required 24 hours' notice for demonstrations, even such a device could in one night be used to store much power in his big steel reservoir. But the investigating committee do not seem to have found any trace of such returning pipe nor any way of concealing the necessary outlet for the exhaust.

Further, if the writer's memory is not at fault, Keely years ago publicly announced that for the time he was stalled because he could not get iron or steel pipe strong enough to withstand the enormous pressure of his "etheric force." Lap-welded iron pipe of the best and toughest iron, three-fourths of an inch in diameter and about one-eighth inch bore, was made for his use and it was ripped open, and burst specimens were shown. Such pressures, whether of gas or liquid, could not have been carried by the brass tubing found by the committee.

I call attention to this apparent gap in the work of investigation, and I believe if some of the committee were to try to design the "simple" air apparatus in its entirety they might be considerably bothered, and find the solution of the fraud on the compressed-air theory about as much of a job as they wish.

T. J. M.

New York, January 21, 1899.

ELECTRICITY DIRECT FROM COAL.

READ BEFORE THE NORTHWESTERN ELECTRICAL ASSOCIATION, MILWAUKEE, JANUARY 19, 1899, BY PROF. A. J. ROGERS.

The only excuse I have for offering the present paper is that it considers a subject in which I have been greatly interested for many years, and in which I would like to see a greater interest awakened among those who have greater opportunity and more time for investigation than I am privileged with. My paper shall, therefore, be more in the nature of a brief review than of an original contribution to the subject.

All who have thought of this subject at all recognize how important it would be to have a carbon battery where C is consumed instead of Zn or other metal, and where the oxidizing agent shall be O of the air or other cheap and abundant material that will directly or indirectly act upon C in some suitable electrolyte.

We all know how wasteful the steam engine is of energy. In the best equipped stations, where the steam engine furnishes large amounts of power, the minimum quantity of coal used per horse-power-hour is from four to four and one-half pounds, while in smaller plants from 10 to 15 pounds are consumed, while the theoretical amount should be about .175 pound.

Engineers tell us that the steam engine is nearly to the limit of its possibilities for improvement. But how imperfect a machine it is and must continue to be if in practice only 5 to 10 per cent of the energy given by the coal can be realized in actual mechanical work?

It is hence well worth the attention of investigators and practical men to make earnest endeavor to carefully explore this field of scientific research to determine what conditions, if possible, are necessary to change C into electrical energy instead of first transforming into heat.

Earlier attempts were made to get a practical C battery, using a rod of C, dipping into a vessel of molten K $N O_3$ or other powerful oxidizing agent.

As early as 1855 Becquerel had used various molten electrolytes with C as an electrode and a platinum dish as a containing vessel and the other electrode.

In 1877 Jablochkoff procured a patent on the use of a solid electrolyte, in a state of fusion, which would act upon C electrode. Thomson, Edison and others proposed practically the same method. In 1882 J. A. Davis proposed to infuse air into the electrolyte, and in 1883 A. M. Clarke used K H O or Na H O and regenerates with air. I believe Rowland states that in his experiments with the process there is no regeneration.

The cell of C. S. Bradley, described by Prof. F. B. Crocker in a paper before the American Institute of Electrical Engineers in 1888, has a fused electrolyte of $Na_2 Mn O_4$ contained in an iron vessel serving as the negative electrode and a C rod dipping to near the bottom of the liquid mass as the other electrode. With the iron pot at a red heat it is stated that an electro-motive force of 1 V and 3 A's was given by one cell. In attempting to verify these results I could obtain only from .1 to .2 of a V, and this did not materially change by the addition of a blast of air. The same voltage can be obtained even when the C rod touches the bottom of the iron pot, seeming to indicate thermo-electric rather than electro-chemical action.

In June, 1894, Professor Ostwald proposed an ideal C O consuming cell. He proposed the use of an outer copper-containing vessel which should serve as anode.

Within this vessel was a porous cup containing the carbon cathode with lumps of C. Surrounding the porous cup was a saturated solution of $Cu_2 Cl_2$ and a constant supply of C O forced into the solution that would be absorbed by it. A stream of air was also supplied to the cathode compartment.

Following out this line of investigation, Dr. Borchers, some five years ago, undertook a series of experiments, using C O and air in an electrolyte of $Cu_2 Cl_2$, which really absorbs C O and O.

Since the heat energy of C O with O is 75 per cent of the told energy of the C with O, if the two gases can be caused to combine, either directly or indirectly, setting free electrical energy instead of heat, a tremendous step would be gained.

Borchers thought he had accomplished the desired result. He claimed to obtain as high as 27 per cent of the calculated energy of combination of C O + O to form $C O_2$, and with gas from bituminous coal he obtained as high as .64 A's on short-circuit, and .56 V's on high resistance with his apparatus, giving him an efficiency of 38 per cent. Many experimenters, including C. J. Reed, in this country; H. H. Barnes and E. Vesemmeyer, of Stuttgart; Rhodin, of Manchester, Eng.; Robert Mond, William Tatlow, and others have repeated Borchers's experiments, varying the conditions, and criticise his results. They consider the electro-motive force as due not to the union of C O with O, but rather as the result of the oxidation of the Cu of the $Cu_2 Cl_2$.

In July, 1897, Borchers read a paper before the Electrical Society of Germany, in which he claims that he has eliminated all sources of error in his coal element.

By the use of glass plates instead of porous diaphragms he separates the $Cu_2 Cl_2$ and $Cu Cl_2$ and prevents diffusion. These glass plates extend into Hg, covering the bottom of the cell. The electrodes are made to revolve in the C O and in the $Cu_2 Cl_2$ to absorb the C O in the best possible manner. By using plates of $Pb O_2$ or $Mn O_2$ instead of metal he obtained an electro-motive force of .5 V's.

Since it is still questioned whether Borchers's experiments are conclusive that electro-motive force is possible with C O and O, I strongly heated two like plates of C in an oven, then immersed one of the plates and allowed it to cool in an atmosphere of C O and the other to remain in air. After cooling they were partially immersed in a vessel of ordinary lake water, and the electro-motive force noted was as high as .4 V. The experiment was also repeated, using a dilute solution of $H_2 S O_4$, with similar results, except that the electro-motive force would more rapidly diminish, probably from decreased internal resistance.

The direction of the current was from the C O charged plate through the external circuit to the O or air plate. To what extent, if at all, the $Cu_2 Cl_2$ acts as a conveyer of C O to O, I think still a matter of doubt.

As early as 1883 Carl Hering and Dabrowolsky report having obtained considerable current with C electrodes, $H_2 S O_4$ as an electrolyte and coal gas brought in contact with one plate and air with the other.

As an aid and a guide to experimental investigation, it would seem to be desirable to determine if the element C can exist in an electrolyte in the ionic state.

With this end in view, Dr. Alfred Koehne, in a paper before the Physical Society of Berlin in 1896 (February 14), attempts to show that C does form ions and therefore it is theoretically possible to oxidize C at ordinary temperatures and obtain electrical energy instead of heat.

He used pure C as anode, hot $H_2 S O_4$ as electrolyte and Pt as cathode. The liquid became yellow, then dark brown and black, and a thin layer of graphite was deposited on the cathode.

Using C and $Pb O_2$ as electrodes and hot $H_2 S O_4$ as electrolyte, he obtained a galvanic cell giving an electro motive force of one volt on a resistance of 100 ohms.

Bartoli and Pasogli had previously found that using $H_2 S O_4$ as an electrolyte and C electrodes, C O and $C O_2$ and O formed at the anode.

Koehne obtained 70 per cent $C O_2$, 29 per cent C O and 1 per cent O.

In the "Zeitschrift für Electrochemie" for 1896 (Vol. 2, p. 581), Franz Vogel thinks that Koehne did not obtain C in solution, and he thinks the C deposited was of mechanical origin and not electro chemical. So it is perhaps hardly yet proven that C does form from free ions in electrolytes at ordinary temperatures. If it does not, the field for investigation in this direction would not seem promising of great practical results.

Within the last two years experimenters have returned again to the fused electrolyte for the carbon-consuming cell.

W. W. Jacques, of Newton, Mass., employs fused Na H O as the electrolyte contained in an iron melting pot. This vessel also serves as an electrode. Air is admitted at the bottom of the iron vessel, and mixes with the electrolyte, and comes in contact with the C electrode suspended in the liquid. $C O_2$ passes off through an opening in the top of the iron tank.

To produce fusion the Na H O is heated to 400 degrees, to 500 degrees $Mn O^2$ and Mg O added and $Mg C O_3$ forms and decomposes so that only a small amount of the oxide is necessary. Jacques states that he used 100 cells, each 30 centimeters deep and 38 centimeters diameter, and obtained a current of 13 A's at 30 V's for 18¾ hours, with a consumption of eight pounds of C.

In another experiment he reports that with 100 cells he obtained 90 V's and 16 A's, giving him an efficiency of 85 per cent of the energy of the carbon consumed.

C. J. Reed says the process is electro-thermic and not electrolytic. He finds that illuminating gas will also produce the same effect as air. He also finds that the C may be replaced by a metal and that the polarity changes at a red heat.

Without having carried these experiments to the same extent as reported by Jacques, I nevertheless have been able to get only a maximum of about .3 of a volt electro-motive force with an iron-containing vessel and electrode, and I question his results, even though they are reported to be supported by the authority of Professors Cross and Rowland.

Employing a Pt crucible instead of iron as the containing vessel and electrode, I find an electro-motive force of nearly .5 V at a red heat of the Na H O.

According to a United States patent, issued to Blumenberg nearly a year ago, superheated steam is injected into the fused electrolyte, consisting of Ca O, Na H O and cryolite. He claims these oxides to give up a part of their O to the C electrode, forming C O and $C O_2$ and then receive back their O from the steam, setting free H. If this is the end of the process it would hardly seem probable that heat or electrical energy would be liberated.

While the problem of obtaining electricity from C direct has not yet received a practical solution, it can not yet be regarded as insoluble.

The chance for success, however, would seem much better in endeavoring to oxidize the easily obtained hydro-carbons and C O.

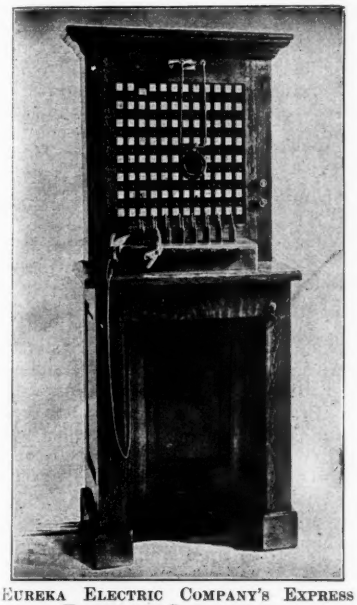
We are chasing no "will-of-the-wisp" in working upon this interesting and far-reaching problem. What is necessary is to discover the right conditions.

If we keep closely to the theory of the galvanic cell, as worked out by Nernst and others, we can not get far astray, and are likely to reach valuable results in the solution of this greatest of technical problems.

If any approach to 100 per cent of the energy of the coal can be secured, an industrial revolution would follow, in comparison with which the invention and perfection of the steam engine is almost insignificant.

The Eureka Express Telephone Switchboard.

In the illustration herewith is shown an express telephone switchboard manufactured by the Eureka Electric Company, of Chicago. These boards are built in 100-line dust-proof



EUREKA ELECTRIC COMPANY'S EXPRESS TELEPHONE SWITCHBOARD.

frames, finished in quarter-sawed oak, and so arranged that by removing the moulding from one side of the cabinet additional cabinets can be placed side by side, thereby increasing the capacity of an exchange 100 numbers at a time. The cabinets always show a finished appearance without disturbing the first section installed, or if larger frames are desired they can be furnished. Each 100-line metallic board is equipped with a full operator's set, comprising the following: Ten pairs of strong, heavy plugs and reenforced cords, so manufactured that they allow a set screw clamping them into the plug handles in such a way that there is no pull upon the tinsel of the cords, and this arrangement does its work so efficiently that it is said to be impossible to pull a cord from a plug in service. Over each set of plugs is a self-contained clear-out drop and listening and ringing cam. This cam is of such construction that it is very easy to operate, and it also controls the ringing on either cord and the cutting in and out of the operator's set.

With each operator's set is included a hand generator warranted to ring through a resistance of from 35,000 to 40,000 ohms, and having heavy quantity output. Thus it can be adapted for ringing either series bells on short lines, also those of high resistance as well, where it is desired to ring a maximum number of bridge bells over a long bridge line.

Improvements in Rheostats.

Owing to the increasing demand for a motor starter that has an automatic release for a protection to the armature, the Ohio Electric Specialty Company, of Troy, Ohio, have recently perfected and placed on the market a new automatic motor-starting rheostat. The rheostat is handsomely finished and so arranged that when the current is broken the small magnet becomes demagnetized, thereby releasing the small armature and breaking the armature circuit.

Though the current return there is no possibility of the motor starting, and when again started it is done so gradually by the arm being swung over in the usual manner and pressed upon the small armature and the resistance slowly cut out by the return of the arm to its original position. The starting boxes are made to stand the current for 30 seconds under full load, and the resistance is in form of coils, smaller sizes of wire wound on tubes, thereby preventing short-circuiting of coils in case the box is overloaded for some time.

Fig. 2 shows the company's new automatic starter with overload device. This starter is used for protecting the motor from overload, lightning and short-circuit, etc. Acting in conjunction with the automatic release, it protects the armature and commutator against a sudden rush of current due to short-circuit or other cause.

Both instruments are built upon highly polished slate and the metal used in the construction carefully finished and put together.

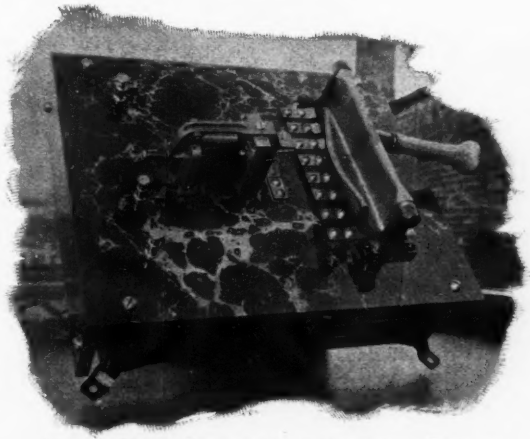


FIG. 1.—MOTOR STARTER, WITH AUTOMATIC RELEASE.

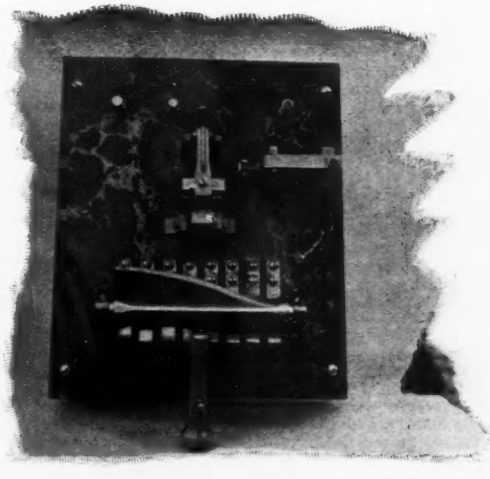


FIG. 2.—MOTOR STARTER, WITH AUTOMATIC RELEASE AND OVERLOAD DEVICE.

Not Interested.

"I would like to interest you in our compressed air motor."

"Compressed nothing! I wouldn't touch it with a 10-foot pole. I'm an expansionist."—*Chicago Tribune.*

A Handsome Lamp Catalogue.

The Columbia Incandescent Lamp Company, of St. Louis, has just issued a new and striking catalogue of its incandescent lamps for all systems. The cover is printed in two colors on a background of red, and is handsomely embossed. The trade slogan of the company, "Unequaled in quality," is prominently apparent. The half-tone illustrations of the various types of lamps shown are of a high order, and the whole catalogue is thoroughly artistic and at the same time practical. The description of each lamp is brief and to the point. A recapitulation at the end of the catalogue shows in tabular form the standard and special lamps carried in stock by the company. Large stocks of standard lamps are also carried at the company's branch offices in New York, Chicago and San Francisco. The Columbia Incandescent Lamp Company, with one exception, has been actively engaged in the manufacture of incandescent lamps longer than any other company in the country. The production of this handsome catalogue is an appropriate method of celebrating its tenth business year.

The Year in the Patent Office.

The receipts of the Patent Office for 1898 were $1,137,734 and the expenditures $1,136,196. During the year 33,915 applications were received for patents, 1,843 for designs, 84 for reissues, 1,796 for trade-marks, 316 for labels and 50 for prints. The patents granted numbered 22,207; trade-marks, 1,238; labels, 200; prints, 35. The number of patents that expired was 15,548, and 4,363 applications were forfeited for non-payment of final fees. At the close of the year 5,915 applications were pending, a decrease of 5,915 compared with the previous year.

The reduction in the number of applications is due to two causes. The first was the change in the patent law, which went into effect on January 1, 1898, requiring inventors to file their applications for United States patents within seven months of the time of the filing of applications for foreign patents, which led to the receipt of abnormally large numbers of applications during the last three months of 1897. The second cause was the war. From April 1 the number of applications received decreased very rapidly, and most of the decrease for the year was within the six months.

Six Thousand Dollars for the Loss of an Eye.

Miss Mary Bardzik recovered a verdict on January 18 for $6,000 for the loss of an eye. She sued for $10,000. The defendant was the Beacon Lamp Company, of New Brunswick, N. J. Miss Bardzik worked for this company, and it was her duty to seal electric lamp bulbs. On the day of the accident at the factory she handled a 100-candle-power bulb, six inches in diameter, and had prepared it to have the air exhausted. The globe was then taken to another room, where it was tested. In doing this the globe was filled with gasoline vapor. Then the globe was sent back. Ignorant of what had been done to the globe, Miss Bardzik applied a flame to it to seal it. An explosion followed, which knocked her senseless and sent pieces of glass into her eyes and face and destroyed the sight of one eye.

NORTHWESTERN ELECTRICAL ASSOCIATION.

(Continued from page 51.)

Mr. Debell: That question (referring to question No. 1 under discussion) was suggested by myself, and I will state that the largest part of the business of our plant is done on a meter basis, and that as high efficiency of lamp is used as we think the station will stand in an alternating system. We have concluded that the only way to increase our capacity in the direction needed is by putting in additional machinery, and what we principally wish to know is, what kind of machinery would be best to put in—the simplest arrangement that would allow us to take on more business in all the different parts mentioned.

Mr. Thayer: What were the previous types of apparatus used?

Mr. Debell: The machinery in use now is an alternating system for incandescent lights, straight arc series—regular series arcs—for doing street and commercial lighting and 500-volt power service.

After further discussion by Messrs. Frund, Thayer, Grover and Copeland, Mr. Debell suggested that the subject be postponed until a later time. The meeting then adjourned, to meet again at 2 o'clock P. M. the same day.

At the afternoon session, which convened promptly on time, President Copeland read his annual address, which was as follows:

Six years ago a few Wisconsin electrical men met together and organized the "Northwestern Electrical Association," calling their meeting its first annual convention and themselves its charter members.

There was no flourish of trumpets; little or no public notice was taken of the matter, and no general interest was manifested in it.

To-day, at its seventh annual convention, the "Northwestern" is the largest electrical association in the country, and its members gather together from Ohio on the east to Colorado on the west, and from Arkansas on the south to Manitoba on the north. The press heralds its conventions months before their dates; full copies of all its convention proceedings, papers and discussions are subscribed for in advance by the leading electrical journals, whose representatives—frequently the editors themselves—are always in attendance at its meetings. Its convention reports have been sent on request to public and private technical libraries in this country and to foreign lands. These and other gratifying facts should be, as doubtless they are, a source of pride to every member, and should stimulate each of us to do his share in promoting the welfare and extending and strengthening the influence and power of this sturdy and vigorous young association, which, in the limited field of its own choosing, has in six short years moved from the foot to the head of its class. The inquiring mind naturally seeks the causes that have operated to this success. I think it is due to, among others, the following:

1. The fact that the association has been, and is, conducted on broad lines, aiming for the greatest good of the greatest number; to benefit the men at the coal pile, the boiler, the engine, the dynamo, the switchboard, and the lamp, as well as the owner and the manager; that it aims to come, and does come, in close touch with the practical men and the practical questions in the everyday operations of all parts of a working plant.

2. The fact that the large majority of our members are men of the Northwest, a virile, active, self-reliant, assertive manhood, eager and willing to learn and no less eager and willing to teach. No better lifeblood can be asked for in any active organization than to have its membership largely of men of the great Northwest.

3. The fact of its economy, it costing but $5 to join, and $5 a year to retain full membership—the lowest cost of any association in the country.

4. The happy combination of business and pleasure that marks our official programmes, attracting men to the meetings and membership because they know either from the programmes sent them, or from their previous experiences with us, or from those of others, that they are coming to meet old friends and make new ones; that they will learn something themselves, or teach something to others, all in an atmosphere of welcome, good will and good fellowship that brings out the best side of their natures and remains a pleasant memory when they return to their homes and their daily routine.

These facts, with others, gentlemen, have made our association what it is to-day.

There are several matters of more or less importance to which I call your attention. One of them is the question of Summer meetings. As you know, our articles of incorporation provide for two meetings a year, on the third Wednesday of January and July respectively.

It has been suggested that the interests of the association would be best subserved by having but one meeting a year, the main reason advanced therefor being that the Summer meetings are but sparsely attended by central station members; they are, therefore, of little value. If the matter comes up I trust it will be fully discussed and acted upon with due deliberation. In this connection I will call your attention to the fact while associate members have, under our present rules, no vote on this or other questions, they are a large, liberal and important element in our membership, and their wishes and interests should have due weight in the consideration of any radical change of association plans.

Another question is whether we should not adopt some systematic plan of compiling and issuing to members published articles of interest to our members, such as articles on municipal ownership, be they in favor of corporations or municipalities; reports of cities operating their own plants, or any other matter that would be of benefit to members of this association.

I would suggest that a committee consisting of the secretary and two members be appointed to collect data, etc., that in their judgment would be of value to the members, have it compiled in suitable shape for filing, and copies sent to each member.

To assist this committee I would suggest that each member, on seeing an article on any subject he thinks of interest, cut it out and mail it to the secretary. We could in time form a valuable pamphlet for ready reference.

Another suggestion is that we have a representative at each state capital in our territory, either a member of the association or some one in our employ, to examine all bills introduced in the legislatures and report promptly on those that in any way affect electrical interests. His report could be made directly to the chairman of the legislative committee, and could then decide the action necessary.

As our association has grown to be quite a factor in the electrical world, and in order to command the respect that is due us, it has become necessary to increase the work in the secretary's office. There are few of you who realize the amount of time and labor required to run his office; similar institutions pay their secretaries a salary. It is not necessary to state the exorbitant salary ours receives. I would suggest you take this matter up and adjust the salary to somewhere compensate for the labor that it involves.

I would also suggest that the dues of members be raised to $10 per year, as the present dues are not adequate for running the association on the lines they should be. The dues of the National Association are $25, the Edison Association $106.50, and I am sure our association is of as much value to its members.

I commend these questions to your consideration.

Association matters have gone so smoothly since we last met that there seems nothing to criticise, unless it would be the steamer convention of last June, which should be judged more as an excursion than a convention. Those who were able to go enjoyed a delightful trip, admirably arranged and carried out.

I would suggest that officers be elected at the end of the convention.

In closing, I call your attention to the programme for this meeting. It is an interesting and attractive one and we should all get pleasure and profit from it. It is from discussions, however, that most benefit results, much being brought out in them that the mere reading of a paper does not give. We are here to learn from each other, and no discussion confined to the points of a paper will be abridged unless absolutely necessary.

I wish you all a "Happy and prosperous New Year."

Mr. Doherty: I move that the president's address be referred to a committee for consideration, and to report on the suggestions that are contained in the address, and I would further suggest that, before that committee goes into discussion, the matter come before the house informally, as there are some things in the report that the committee could not very well decide upon without getting an expression of an opinion generally from the convention, especially regarding the question of the raising of the dues, etc. I move that a committee of three be appointed by the secretary to consider this address.

Motion seconded and unanimously carried.

Mr. Norcross offered a resolution, which was carried, that the president appoint a committee of five to present to the convention nominations for officers for the ensuing year and to consider the recommendations in the president's address, the committee to report at Thursday morning's session. The president appointed as the committee Messrs. Norcross, Debell, Livermore, Kountz and Doherty. Mr. Doherty later withdrew from the committee, and Mr. Lord was appointed in his place.

Mr. Debell made a motion, which was unanimously carried, that the programme as printed be carried out. A congratulatory telegram from Mr. J. M. Hill, at Hartford, Ct., to the association was here received and read. After three applications for membership had been presented the president announced that new business was next in order.

Mr. Schuette then presented the following resolution:

Resolved, That Article II of our by-laws be amended by adding a new section, as follows:

Section 3. Whenever the Officers of this Association may deem it necessary to raise funds for the purpose of protecting the material interest of our Central Station Owners, in that case they are hereby authorized and directed to levy an assessment on all Central Station members in Wisconsin, in an amount not to exceed 10 cents for each kilowatt dynamo capacity of their plants, in any one year.

Mr. Schuette: Perhaps we might change this suggestion of 10 cents to one mill on the gross receipts. The only objection I see to that is that we would disclose our income. I would suggest further that besides this assessment that all central stations not members should be requested to contribute to this fund the same as members do here. I suppose there are one third of the stations in the state of Wisconsin that are not members, but they should contribute. They receive the advantage.

Motion was then made and seconded that the resolution be adopted.

A lengthy discussion ensued, in which it was advocated by several members that other states besides Wisconsin be included in Mr. Schuette's resolution. Finally, Mr. Norcross moved that the matter of assessment be referred to the committee of five previously appointed, with instructions to report on Thursday morning. This was carried unanimously.

Mr. B. J. Arnold then read his paper on "Trend of Central Station Design." Considerable discussion followed, and a vote of thanks to Mr. Arnold was passed.

Mr. E. L. Debell followed with a paper on "Meter-Rate Systems." An interesting and lengthy discussion of the paper followed.

Prof. A. J. Rogers was introduced and read a paper on "Electricity Direct from Coal," which called forth a vote of thanks from the association.

Mr. Doherty: There are some changes that I wish to offer to the by-laws. I desire to offer an amendment to the first section of the by-laws, which reads: "The annual meeting of the association shall be held the third Wednesday and Thursday in January, in Milwaukee," so that there shall be added, "or at such a time and place as the directors may elect." That the order of business be changed so that the election of officers will come at the order of business next to the close, rather than the second or third order of business, as the case is now. That another article be added to the by-laws empowering the directors of the association to transfer members from one class to another at their discretion, subject to the ratification of the convention. That provision for the election of honorary members shall be made that the election shall not take place within six months from the date of nomination.

On motion duly made and seconded the convention adjourned, to meet in the same place, Thursday, January 19, at 10 A. M.

THURSDAY, JANUARY 19.

The convention was called to order at 10.40 A. M., with President Copeland in the chair. The report was called for of the committee of five, appointed on the previous day to present nominations for officers and to consider other matters. Mr. Norcross, chairman of the committee, reported these nominations for officers for the ensuing year:

President, Henry L. Doherty, of Madison, Wis.; first vice-president, John H. Harding, of Laporte, Ind.; second vice-president, S. B. Livermore, of Winona, Minn.; secretary and treasurer, Thomas R. Mercein, of Milwaukee; board of directors, Col. W. W. Bean, of St. Joseph, Mich.;

J. H. Culver, of Decatur, Ill , and George Innes, of Eagle Grove, Iowa.

Mr. Lord made the remainder of the committee's report as follows: The committee recommends that the salary of the secretary-treasurer be raised from $150 to $300 per annum, beginning this fiscal year; that the association hold no Summer meeting in 1899; that in accordance with the president's suggestion, there be created an information committee composed of the secretary and two other members, and that those other members be P. H. Korst, of Racine, Wis., and E. L. Debell, of Sheboygan, Wis.; that the matter of representation at state capitals within the association's jurisdiction, during the sessions of the respective legislatures, be left entirely with the president and secretary and protective committee; that Mr. Schuette's, Mr. Foster's and all similar resolutions be referred to the president, secretary and protective committee, giving them full authority to incur such expense as becomes necessary, and to raise the funds for defraying the same, in such manner as they deem just and equitable; that the annual dues remain at $5.

On motion of Mr. Schott the report of the committee was unanimously accepted and adopted.

The secretary, on motion of Mr. Kountz, cast the ballot of the association for the officers nominated by the committee. The president declared the gentlemen named elected, and appointed Messrs. Norcross and Lord a committee to wait upon the president-elect.

On Mr. Livermore's motion it was decided to place the discussion of questions in the question box at the end of the regular programme.

Prof. Dugald C. Jackson, of Wisconsin University, then read a paper entitled "Inductive Loads on Alternating Current Transformers." The reading of the paper was interrupted by the appearance of President-elect Doherty, who was presented to the convention and said:

I am not a speechmaker, but I will do what I can to aid in continuing the prosperity of the association next year, and I feel greatly honored at being selected as your president.

Mr. Norcross: I move that we tender the outgoing president our sincere thanks for the hard work he has done in the past year.

Mr. Doherty: I do not wish at present to take the chair. There are some changes I want to suggest for the association. One is a change that affects matters under consideration now, and that is, that the president instead of taking his seat in the middle of the sessions of the association, should do so at the close of the proceedings. I think it is unfortunate for a new president to be required to take the chair during the convention, and that the convention will get greater satisfaction from the old president. If President Copeland will, therefore, continue in the chair it will confer an obligation upon me, and I will feel freer to occupy the chair until the close of the next year.

The thanks of the association were voted to the retiring president and the secretary. A motion was made and carried that the old officers hold over until the end of the session. Professor Jackson then continued the reading of his paper, which was the subject of an interesting discussion. The thanks of the association were voted to Professor Jackson for his paper.

Mr. George L. Thayer then read a paper on "Design of Secondary Circuits in Alternating Plants." The discussion which followed was general and lengthy. A vote of thanks was passed to Mr. Thayer.

Mr. H M. Maxim's paper on "Electric Vehicles and Their Relation to Central Stations" was read by Mr. Lord, and called forth the thanks of the association.

"Utilization of Exhaust Steam" was the title of a short paper read by Mr. J. H. Harding, for which the association voted its thanks and which was interestingly discussed at great length.

At this point President Doherty took the chair and said:

I presented for the consideration of the association yesterday several amendments, and I would like to have action taken upon them now.

The president's suggestions referred chiefly to the place of holding the annual conventions, certain changes in the by-laws and the adoption of a button to be worn by members. After considerable discussion it was decided to leave all these matters to a committee to be appointed later, which would be instructed to report at the next annual meeting.

The President: There are four committees to be appointed—protective, ways and means, programme and entertainment. The protective committee was formerly composed of Mr. Norcross, myself and Mr. Mullen. There is some question at this time who would be the most available on that committee, and the selection only goes so far as to continue Mr. Norcross as chairman, and the others will be put on the committee as quickly as the mail will permit.

Mr. Norcross: I suggest that Mr. Lord and Mr. Grimm, of Jefferson, compose the balance of that committee.

The President: Very well. I really do not know what the ways and means committee have to do, and I see no reason for appointing the committee at this time. The committee will continue until its successors are appointed

Mr. Debell, on motion, was appointed a committee of one to edit the proceedings of the convention.

On motion, the meeting adjourned to 10 A. M. Friday.

FRIDAY, JANUARY 20.

President Doherty called the meeting to order at 10.30 A. M.

The President: I will appoint Mr. Thomas R. Mercein as a delegate to attend the convention of the National Electric Light Association, to be held this year. I will appoint as committee on badge and proposed amendments to by-laws, committee to report at the next annual meeting of this association, Messrs. D. C. Jackson, L. E. Kerns and L. W. Burch.

On motion duly made, seconded and unanimously carried, the convention adjourned.

THE EXHIBITS.

A few companies had exhibits in their rooms, as follows:

The Central Electric Company, of Chicago, showed the "Zeco" arc lamp. The excellent catalogue issued by this company a short time ago was much talked of.

In the parlors of the Victor Telephone and Manufacturing Company, of Chicago, were shown the complete line of telephone apparatus, consisting of switchboard, wall and desk 'phones and other specialties original with this company.

The Western Electric Company had A. McNab Little and W. S. Hine as their representatives, and these two gentlemen were busy receiving friends of the company in their rooms.

The Western Electric Company gave to their friends a card-case and calendar of a very pretty design.

The Electric Appliance Company, of Chicago, gave a useful souvenir, a lead pencil made of paper in red, white and blue.

The Chicago Incandescent Arc Lamp Company had an enclosed arc lamp in their room, which is being manufactured by this company. The company has just placed this lamp on the market, and are meeting with many sales.

The General Electric Company had five men at the convention—F. N. Boyer, R. A. Swain, Thos. Ferris, F. W. Willcox and J. M. Scribner—and were showing a 60-cycle, single-phase induction motor and a two-rate meter in operation.

The Wagner Electric Manufacturing Company, of St. Louis, had an alternating-current dynamo in operation, and showed their switchboards, instruments and ventilating fan. They had many visitors.

The Electric Supply Company, Madison, Wis., Northern Electric and Manufacturing Company, and Standard Telephone and Electric Company had headquarters in Room 20.

Martin J. Insull exhibited the Wright discount meter and samples of Fort Wayne incandescent lamps, Bergmann switches, Pittsburg transformers and other specialties handled directly by him.

The Electric Appliance Company was in evidence, being represented by the popular Willard W. Low. Many friends of the company called at their rooms. The popularity of this company at the convention was demonstrated.

Leschen, Macomber & Whyte gave to their friends a neat memorandum book as a souvenir. Mr. George S. Whyte, secretary of the company, looked after their interests at the convention.

The Hart & Hegeman Company was represented by George S. Searing, of Chicago, who is well known to the trade.

Several flashlight pictures were taken of some of the rooms.

THE ATTENDANCE.

Those who registered with the secretary were as follows:

H. C. Higgins, Marinette; B. W. Strong, Baraboo; H'y Doherty, Madison; S.B. Livermore, Winona, Minn.; E. W. Buss, Chicago; F. D. Nims, Muskegon; E. L. Draffen, Chicago; W. P. Bragg, Monroe; S. A. Pearce, Negaunee, Mich.; J. H. Calocks, Freeport, Ill.; F. A. Copeland, La Crosse; Adolph Hamock, Sturgeon Bay; Pliny Norcross, Janesville; M. B. Austin, Chicago; Frank Kellogg, Spencer, Iowa; E. A. Upham, Marshfield; F. H. Pamperie, Oconto; G. A. Davis, Neenah; R. F. Schuchardt, Chicago; C. C. Paige, Oshkosh; Alex. Dow, Detroit; George Peck, Detroit; L. E. Kerns Madison; Frank L. Perry, W. R. Upham, Chicago; George L. Thayer, Belle Plaine, Iowa; George W. Patterson, Chicago; J. H. Harding, La Porte, Ind.; Edward R. Grier, Geo. L. Searing, Chicago; A. Cross, West Superior; C. E. Van Bergen, Duluth Minn.; J. D. Ralph, Owosso, Mich.; A. W. Foster, George S. Whyte, Chicago; J. R. Dee, Houghton, Mich.; Fred Deland, C. T. Gage, Chicago; W. Worth Bean, St. Joe, Mich.; A. B. Conover, Chicago; W. Worth Bean, Jr., St. Joe, Mich.; H. O. Channon, Quincy, Ill.; E. H. Hammond, Chicago; A. E. Lucas, Marion, Ind.; W. W. Low, Chicago; L. W. Burch, F. L. Stagg, Madison; George P. Rex, Chicago; John T. McRoy, New York; A. L. Tucker, A. M. Little, Chicago; W. J. Troll, Big Rapids, Mich.; E. L Debell, Sheboygan; J. B. Morrill, Evanston, Ill.; C. W. Baron, Madison; O. P. Kissell, Hartford; J. B. O'Hara, Chicago; A. C. Langstadt, F. G. Kurz, Appleton; Otto Langstadt, La Crosse; C. A. Ross, C. E. Kammeyer, Chicago; H. J. Gilles, St. Paul; P. H. Korst, Racine; W. P. Collins, Wausau; Morgan Brooks, Minneapolis; Irving P. Lord, Waupaca; D. C. Jackson, Madison; C. E. Gregory, Harry Floy, Chicago; G. H. Strang, Richland Center, Wis.

The various companies were represented as follows:

Columbia Incandescent Lamp Co., George P. Rex; American Circular Loom Co., Geo. W. Patterson; Cosmopolitan Electric Co., W. H. Schott; Illinois Electric Co., H. E. Adams, D Dewy Newman; M. B. Austin & Co., M. B. Austin, W. A. Brown, E. W. Chandler; General Electric Co., F. M. Boyer, R A. Swain, Thomas Ferris, T. W. Wilcox, J. Scribner; Chicago General Fixture Co., Frank Overbaugh, L. W. Kittman; Westinghouse Co., W. R. Pinckard; Chas. E. Gregory Co., Francis Raymond; Badger Electric Co., Paul A. Korst; Electric Appliance Co., Willard W. Low, B. B. Downs; Washburn & Moen Manufacturing Co., E. J. Pietzcker, C. T. Gage; Western Electric Co., A. McNab Little, W. S. Hine; Wagner Electric Manufacturing Co., Eugene H. Abadie. —— Foster; Central Electric Co., Charles E. Brown, F. M. Pearce, C. W. Cobb; Eddy Electric Manufacturing Co., Edward L. Barr; McGill & Pomeroy, J. G. Pomeroy; Commercial Electric Supply Co., James P. O'Brien; Chicago Incandescent Arc Lamp Co., Leo Keller, J. L. Barr; Leschen, Macomber & Whyte, Geo. S. Whyte; L. A. Chyse & Co., Seers B. Condit; Victor Telephone Manufacturing Co., W. T. Blaine, A. J. Rosseau; Sprague Electric Manufacturing Co., Chas. G. Burton and E. B. Kittle; Martin J. Insull, M. J. Insull, C. D. Heile, Thomas James; Hart & Hegeman Co., Geo. S. Searing; Dearborn Drug and Chemical Co., Willis D. Jameson, J. M. Frye; ELECTRICAL REVIEW, Frank E. Colbert.

BELTS AND BELT DRESSINGS.

BY OSCAR E. PERRIGO IN "AMERICAN MACHINIST."

That it is necessary to apply to leather belts some sort of a dressing from time to time is generally conceded. That whatever preparation is used should be of such composition as to suit the particular conditions of speed, temperature, humidity and other circumstances would seem to be indisputable. Belts running in a dry and hot location require oil to keep them soft and pliable, and to insure such an adhesion to the pulley as to enable them to transmit the power proportioned to their width and velocity. Otherwise the belts will dry up, crack and become worthless in half the time that they should. Belts running in a moderate temperature, and where the oil from machinery occasionally splatters on them, will usually get more oil than they need, and if mineral oil is used, it is apt to do more harm than good.

Where oil is applied to belts, it would seem that an animal oil would be preferable, although castor oil seems to have many friends. The engineer usually has his own favorite preparation for the main belts, and his preference generally works well when he uses it himself, but not always as well if issued to the workmen throughout the shops. Therefore the necessity still remains for the use of some kind of belt dressing that may be put in the hands of employés generally for use by them as occasion seems to demand. These occasions are usually when a belt slips from becoming dry and hard, and occasionally where a belt is required to transmit for a limited time a greater power than was originally intended.

After using and seeing used many of the usual belt dressings in the market, experiments were made to ascertain what composition would be best suited for ordinary, everyday use in the shop, and the following compounds are the result. These preparations have been in use for several years and give good satisfaction.

For a liquid dressing to be used in Summer, take: Beeswax, four pounds; pitch, five pounds; resin, three pounds; neatsfoot oil, 13 pounds. Melt the beeswax first, and add the other ingredients in the order named.

For the same dressing for Winter use, the neatsfoot oil should be increased to 15 pounds.

For a solid preparation for Summer, take: Beeswax, 6 pounds; pitch, five and one-half pounds; resin, seven pounds; neatsfoot oil, one pound.

For Winter the resin should be reduced to six and one-half pounds.

This composition is prepared in the same manner as before, and poured into molds of convenient size—say, three by six inches, and one and one-half inches deep. These molds may be of metal or wood. They should be so constructed as to be easily taken apart, as the preparation adheres quite strongly to them. To avoid this, they may be rubbed over with chalk, whiting or graphite.

As to the relative qualities of the solid and fluid preparations, it may be said that the fluid state is the best if it is properly used, but that it is so readily applied that, ordinarily, two or three times as much is applied as is necessary. On the contrary, that in a solid form, being held against the running belt until a sufficient quantity is carried off, is not so apt to be wasted, and is therefore more economical. But it is also to be considered that the solid preparation does not contain as much neatsfoot oil as the liquid, and this oil is valuable as a preservative. Hence, the choice should be made with reference to these features.

As to cost, it is, at present prices, as follows, taking the solid preparation for Winter use:

6	pounds beeswax, at 35c..	$2 10
5½	pounds pitch, at 8c.....	44
6½	pounds resin, at 4c.....	26
1	pound neatsfoot oil, at 12½c.....	12½
19	pounds.....	$2 92½

Which is practically 15½ cents per pound. The liquid is within a small fraction of the same cost; so that it will be seen that it is not expensive. The expense might be still reduced, but practice indicates that, all things considered, the above proportions will give the best satisfaction.

Warren Electric and Specialty Company's Officers.

At the annual election of the Warren Electric and Specialty Company, of Warren, Ohio, the old board of directors were again chosen as follows: T. H. Gillmer, J. W. Holloway, E. W. Gillmer, C. B. Selby and C. H. Angstadt. All of the stock was represented, either by person or proxy. Officers chosen were: President, T. H. Gillmer; vice-president, C. H. Angstadt; secretary and treasurer, E. W. Gillmer. The concern has had a very prosperous year, and declared a dividend of six per cent for the past six months.

ELECTRIC RAILWAY NOTES.

The City & Suburban Railway Company, of Washington, D. C., have obtained control of another feeder line, the Capitol Railway Company. This line was built to accommodate the district known as Congress Heights. It was not a profitable enterprise. As an auxiliary line, a part of the new combination, it will be a great advantage to them.

The District Commissioners of the City of Washington have proceeded against the Metropolitan Traction Company to recover the cost of relaying paving on F street, due to the building of a sewer. The Metropolitan company in their answer cite as facts, that the defendant company when completing their tracks completed the paving and kept it in good order, as provided by law; that the laying of the sewer was no concern of theirs, and that they can not be held within the rightful meaning of the law for damages caused by such construction.

The City and Suburban Railway Company have petitioned the House of Representatives to be allowed to lay an underground conduit road, to be known as a cross-town road. The proposed line will begin at S street and Lincoln avenue, running along S street westwardly to Twenty-fourth street west, south on Twenty-fourth street to Massachusetts avenue and along Marsam to R street and eastwardly on R street to Lincoln avenue. The proposed road is approved by the North Capitol Street and Eckington Citizens' Association and will probably be built.

A suburb of Harrisburg, Pa., is stirred up over a proposed new road to connect the village with Harrisburg. The line will be four and one-half miles long. Considerable diversity of opinion exists as to whether a steam road or an electric road will serve the citizens best. Freight facilities are wanted and the opponents of the electric system claim the steam road only can give such service. Some one in Philadelphia proposes to supply the rails and one engine and take stock for his share, the citizens as a company to build and equip the road. Where are our electric railroad hustlers?

The New York State Court of Appeals has decided that the Constitutional Amendment of 1894 does not make the consent of abutting owners an immediate and indispensable prerequisite to the use by a street railroad of the tracks of another. The test case was made by Oliver W. Ingersoll, who brought suit against the Nassau Electric Railway Company to restrain the defendant from operating its railroad on Bergen street, Brooklyn, N. Y., on the ground that it had not obtained the consent of the property owners along the line. In Special Term, Justice Cullen held that the company had a perfect right to operate its road over the tracks of the Atlantic Avenue Railroad Company in Bergen street without procuring the consent of abutting property owners, and judgment was entered accordingly, which, upon appeal, was affirmed by the former General Term, second department. The Court of Appeals upholds the decisions of the lower courts.

A New Meter Catalogue.

Ten years ago electrical energy was invariably supplied at a fixed rate per month for each installation without much regard to the amount actually furnished. To-day electric stations in this country supply on a meter basis the electricity they manufacture with resultant advantage to the station economy. Some idea of the extent to which the meter business in this country has grown may be gathered from the fact that not less than 200,000 Thomson recording wattmeters alone have been manufactured and sold by the General Electric Company.

The business has grown from small beginnings by the persistent missionary work which has been carried on by this company through both agents and literature. The latest addition to the meter literature issued from the General Electric press is "Thomson Recording Wattmeters," a handsomely printed and illustrated brochure in a rich cover, dealing with the different types of these recording energy meters which the General Electric Company manufactures, their uses and their disadvantages. Each type of meter is clearly described and so illustrated that its construction can readily be understood. Full instructions are given for the care, connection and reading of these meters.

The pamphlet should be found in the library of every electric light and power-station, and will be sent on application made to the Schenectady office of the General Electric Company.

M. C. McKeown, of Barnsville, Ohio, will soon publish a book, entitled "Some Memories of Mining Life, or Five Years on the Gold Fields of New Zealand." The work is described as being an interesting narrative of the experience of a venturesome gold-hunter, who also vigorously assails many geological theories hitherto generally accepted as facts.

Telephone News .....and Comment

The Citizens' Telephone Company, Washington Court House, has increased its capital stock from $20,000 to $30,000.

The Ansonia Telephone Company has increased its capital stock from $10,000 to $15,000, all of which has been taken by the old stockholders.

Out in Bay City, Mich., the butchers have organized to do without telephone service. It is now announced that the telephone company will organize a meat market.

At the annual meeting of the stockholders of the Lebanon, Ind., Telephone Company the old officers, C. M. Zion, president, C. W. Scott, secretary and treasurer, were reelected. The plant is to be rebuilt and changed this year to the drop-shutter system.

At the annual meeting of shareholders of the Westport & Digby, N. S., Telephone Company the following gentlemen were elected as directors for the ensuing year: Maj. John Daley, Edwin Hains, R. W. Ford, S. T. Payson and J. H. Churchill.

The Conneautville, Pa., Telephone Company elected the following officers at their annual election: President, R. F. Wilcox; secretary, L. D. Carey; treasurer, J. T. Snodgrass; directors, J. H. Smith, D. E. Hewitt, W. J. Darby, R. F. Wilcox, L. D. Carey and J. T. Snodgrass. The line will be extended to Beaver Centre at once.

At the annual meeting of the Catskill Mountain, N. Y., Telephone Company, F. W. Atwater was elected president; Hon. F. G. Walters, vice-president; F. M. Goslee, secretary and treasurer, and the following board of directors: F. W. Atwater, Hon. F. G. Walters, F. M. Goslee, S. W. Stevens, B. O. Peck, F. L. Dodge, and R. A. Austin.

At the annual meeting of the Warren, Ohio, & Niles Telephone Company directors were elected as follows: Washington Hyde, George B. Devoe, M. S Clapp, Jules Vautrot, Jr., C. W. Devoe, E. J. Clapp, A. B. Conklin. The directors elected E. J. Clapp, president; Washington Hyde, vice-president; H. J. Barnes, secretary, treasurer and manager.

At the annual meeting of the stockholders of the Delaware County Telephone and Telegraph Company the old board of officers and directors were reelected as follows: President, R. W. Gough; vice-president, George W. Sharp; secretary, Harry V. Smith; treasurer, Joseph Messick. The above officers constitute the board of directors, together with John Genther.

At a meeting of the Ottumwa, Iowa, Long-Distance Telephone Company the following officers were reelected for the ensuing year: President, J. C. Goddard; first vice-president, J. H. Merrill; second vice-president, J. B. Sax; secretary and treasurer, A. H. Cowdery; board of directors, J. C. Goddard, A. H. Cowdery and P. E. Wilcox.

At the meeting of the stockholders of the East Branch Telephone Company, N. Y., the following officers were elected: President, H. J. Williams; secretary, C. J. Holmes; treasurer, J. C. Conklin; superintendent, E. E. Conlon. The following are the directors: P. H. Lawless, J. S. Allen, H. J. Williams, E. E. Conlon, C. J. Holmes, J. C. Conklin, Isaac Fletcher.

Interesting experiments which promise to revolutionize telephonic communication between railroad stations where a large amount of business is being transacted were conducted at Crookston, Minn., this week under the supervision of Superintendent of Telegraph Adams and Local Manager Hall, of the Great Northern Railway. The telegraph wires were used for telephone purposes while they were being used by the telegraph operator without interference to their usefulness for telegraphing. Heavy induction coils in condensers were attached and conversation was carried on with a point some distance away. The plan will be adopted on the entire Great Northern system.

A new telephone bill made its appearance in the New York State Assembly on January 18. It was introduced by Assembly O'Connor, of New York, and provides that the telephone rates in New York city shall not be more than $144 per annum for 2,000 messages or less, and a rate of five cents per message for each additional message beyond that number. The bill provides that all users of telephone service to the extent of $1,000 or over shall be entitled to a 10 per cent reduction on the above toll charges, and telephone companies operating within New York city are authorized to contract with private individuals at the rate of $80 per year for 1,000 messages or less, and all public telephone stations shall not charge more than eight cents per message. Mr. Cain also introduced last year's telephone bill providing that no more than $85 should be charged per year for telephone service in New York city.

In a recent lecture Prof. Alexander Graham Bell is reported to have explained how he came to invent the telephone as follows:

"My father invented a symbol by which deaf mutes could converse, and finally I invented an apparatus by which the vibrations of speech could be seen, and it turned out to be a telephone. It occurred to me to make a machine that would enable one to hear vibrations. I went to an aurist, and he advised me to take the human ear as my model. He supplied me with a dead man's ear, and with this ear I experimented and upon applying the apparatus I found that the dead man's ear wrote down the vibrations.

"I arrived at the conclusion that if I could make iron vibrate on a dead man's ear, I could make an instrument more delicate which would cause those vibrations to be heard and understood. I thought if I placed a delicate piece of steel over an electric magnet I could get a vibration, and thus the telephone was completed.

"The telephone arose from my attempts to teach the deaf to speak. It arose from my knowledge, not of electricity, but as a teacher of the deaf. Had I been an electrician I would not have attempted it."

On June 27 last an ordinance for the Illinois Telegraph and Telephone Company was introduced into the council for a franchise to operate a telephone system in the city of Chicago and providing that all the wires in the district bounded by North and Ashland avenues, Thirty-ninth street and the lake, shall be under ground. The ordinance was referred to the City Council Committee on Gas, Oil and Electric Light at that time and nothing was heard of it until this month. During the last council meeting it was taken up and recommended for passage. Chas. H. Aldrich, ex-Solicitor General of the Treasury, had told the committee that if the ordinance was passed a telephone company in competition with the present one would be started in Chicago. Hence the action. The maximum charge which can be made for use of a telephone is $80 per year. The company say they will furnish the telephones for use in the City Hall free, and charge but $5 a year for those used for fire and police service. Mr. Aldrich says there are few Chicagoans in the deal, the interested capital coming from St. Louis from men who are associated with Mr. Aldrich in the independent telephone company of that city. The capital stock now represented is $250,000, but this will be increased to $4,000,000 if the franchise goes through. The ordinance of the Chicago Telephone Company was granted in November, 1889, for 25 years. Under this ordinance the maximum price which can be charged is $126 per year, the company paying three per cent of its gross receipts to the city.

Telegraph Line Construction in Cuba.

Captain Brady, of the signal service, in charge of the military telegraph operations in the eastern end of Cuba, with headquarters at Santiago, is in the United States on leave, and made an interesting report to General Greely on the progress of the work and the general condition of affairs.

Captain Brady has charge of the building of telegraph lines, which are fast connecting all the eastern points of Cuba, and will eventually connect these points with Havana and the rest of the island. In this work he is under Colonel Dunwoody, stationed at Havana, although his province takes in all the eastern section. He says the lines have now been completed connecting Santiago with Guantanamo; also 100 miles west of Santiago, on the way to Manzanillo. Then at Bayamo a loop will be run northward to Holguin. With this completed, all the strategic points of eastern Cuba will be connected. The line from Havana now runs east to Santa Clara, which is 250 miles from Holguin. It will require, therefore, only this 250 miles from Holguin to Santa Clara to complete the system of land lines from east to west of Cuba. Up to the present time all communication from Havana to Santiago has been over the British cable line skirting the south coast of the island.

Captain Brady says he has employed Cubans, usually former soldiers, for the rough work of constructing the lines. A construction party is made up of about 25 of these Cubans, with an officer of the signal service in charge, and several Americans to direct the work. He says the Cubans are good workers and yield first class results as long as they have capable direction.—*Telegraph Age.*

ADVANCE INFORMATION

Electric Light and Power.

NEWPORT, N. Y.—Newport Electric Light and Power Company has been incorporated by Wm. D. Grant, B. K. Brown and Henry H. Dexter; capital stock, $15,000.

SHERMAN, N. Y.—Sherman Electric Light Company has been incorporated by Charles E. Cobb, F. D. Cornish, Charles H. Corbett, Thomas J. Newell and others; capital stock, $5,000.

TRENTON, N. J.—The Bergen County Gas Light Company and the Englewood Electric Light Company have been consolidated into the Englewood Gas and Electric Company, with an authorized capital of $400,000.

HENDERSON, TENN. — Electric Light Company, incorporated by T. B. Hardmann, N. J. Ozier and others; capital stock, $1,500.

WELDON, N. C.—Weldon Cotton Manufacturing Company. W. T. Shaw, president, Weldon, N. C., will buy electric light plant of about 850 16-candle-power lamps.

GURLEY, ALA.—J. W. Roberts wants prices on small electric lighting plant; second hand outfit would answer.

New Incorporations.

WACO, TEX.—Hill Bros. & Company has been incorporated by B. H. Hill, N. S. Hill and E. Phillips, to engage in a general plumbing and electrical supply business; capital stock, $10,000.

BALTIMORE, MD. — The Westrom Manufacturing and Light Company has been incorporated by F. C. Latrobe, H. M. Denison, C. M. Hutton, J. O. Morris, G. B. Baker and Peter Tome, to manufacture electrical machinery; capital stock, $27,155.

NEW YORK, N. Y.—United Electric Company, incorporated under the laws of West Virginia, by W. E. Sheffield, P. K. Green and others, to manufacture dynamos, motors, etc.; capital stock, $1,000.

SPRINGFIELD, ILL.—Sangamo Electric Company has been incorporated by T. F. Sheridan, T. B. McGregor and F. G. Houser, to maintain or manufacture electrical appliances; capital stock, $10,000.

PORTLAND, ME. — New England Electric Power Company, principal office, Portland; authorized capital, $500,000; subscribed capital, $500,000; paid in, nothing. Incorporators: P. S. Saltonstall, Milton, Mass.; E. P. Shaw, D. K. Snow, Brookline, Mass.; S. R. Anthony, N. Anthony, A. Potter, F. Y. Hall, Boston; W. G. Beancroft, Auburndale, Mass.; E. P. Kidson, Neponset, Mass.; R. M. Saltonstall, Newton, Mass.; H. E. Boothby, Reading, Mass.; J. Drummond, J. Drummond, Jr., Portland.

New Telephone and Telegraph Companies.

LAKELAND, MINN.—The Interstate Telephone and Telegraph Company has been incorporated by Robert H. McCoy, Frederick W. Epley, Albert T. Presson, William J. Johnson and Harry L. North; capital stock, $10,000.

KINSLEY, KAS.—The Kinsley Automatic Telephone Company has been incorporated by C. B. Knowles, George W. Watson, W. F. Watson, A. F. Aderhoid and T. E. Aderhoid; capital stock, $2,000.

TOPEKA, KAS.—The Popular Telephone Company has been incorporated by E. F. Ware, Webster Wilder and D. E. Palmer; capital stock, $1,000,000.

FAYETTE, MO.—The Fayette Telephone Company has been incorporated by C. E. Betts, H. K. Givens, C. E. Givens and others; capital stock, $10,000.

AUGUSTA, KY.—The Augusta Telephone Company has been incorporated by T. S. Bradford and others; capital stock, $5,000.

New Electric Railways.

SYRACUSE, N. Y.—The East Side Traction Company has been incorporated by Wm. G. Tracy, Geo. D. Chapman, C. M. Warner, F. M. Bonta and others, to operate an electrical road 18 miles long in Syracuse; capital stock, $400,000.

CLEVELAND, OHIO—The Cleveland & Warren Street Railroad Company has been incorporated by M. Dodge, C. E. Thorp, J. B. Caslett, J. E. Phelps and C. B. Lockwood, to operate an electric road; capital stock, $10,000.

ALTON, ILL.—The Alton & East Alton Railway and Power Company has been incorporated; capital stock, $100,000; incorporators, Oliver S. Stowell, Henry S. Baker and George M. Ryrie.

RICHMOND, VA. — The Virginia Electrical Railway and Development Company will probably receive bids before February 1 for the proposed electric plant, with a capacity of 7,000 horse-power, 4,000 horse-power of which will be installed at once; estimated cost, $700,000. Smith & Fisher and Edward J. Willis are the engineers (designing and electrical, respectively); William Todd, assistant manager of the company, Richmond, Va.

The Michigan Electric Company.

The Michigan Electric Company, of Detroit, Mich., who were almost completely burned out on September 24, have, since that date, had their building entirely rebuilt, and have taken the opportunity since the fire to have everything planned and built in a manner best suited to the needs of their business. They moved into new quarters about the middle of last month, but are only now getting thoroughly settled and are just opening their new supply store on the first floor, having up to this time been doing business temporarily on the upper floors.

As a whole, their new store, and in fact their whole building, is one of the finest and best arranged of any in the electrical line in the United States, many of the best houses having been carefully inspected before their new place was planned. The idea has been to make it convenient in every particular, with fixtures and furnishings of a plain, good substantial character, the general tone of the whole being such as will impress customers and visitors with the standing and character of the firm. The building is 20 by 100 for four floors and basement, and is fitted with one passenger elevator, one freight elevator and one hand-package elevator, each running the entire height of the building.

The first floor is devoted entirely to the electric supply store, and it is probably the handsomest one in the country.

The second floor is devoted to general offices for contracting shopwork, manufacturers' agents and the accounting department.

The third floor is devoted wholly to their wholesale stock, all unpacking and packing of goods being done on this floor, the arrangements in every detail being exceptionally convenient.

The fourth floor is devoted wholly to the shopwork, where electrical machinery and appliances are repaired, electric specialties are manufactured, and electric fixtures from the plain line ordinarily used to the ones of special designs are manufactured. This floor is complete with general workshop, polishing-room, plating outfit, baking-oven and stock-room.

The Officials of the National Carbon Company.

The electric lighting interests have been eager for the news of the recent organization into one corporation of the carbon point manufacturing companies. There is an expression of satisfaction that men eminent in the line of supplying electric light to the public are connected with the new company, notably A. M. Young, of New York, and James Parmelee, of Cleveland.

The officers of the company have been elected as follows: W. H. Lawrence, president; James Parmelee, vice-president and treasurer; Webb C. Hayes, second vice-president; Henry J. Davies, secretary, and D. D. Dickey, general manager. The directors include the above officials, with the exception of Secretary Davies, and the following named gentlemen: Myron T. Herrick, Cleveland; James S. Humbird, Pittsburgh, president of the Washington Carbon Company; J. C. Van Blarcom, of St. Louis, cashier National Bank of Commerce; Hugh H. Hamill, Trenton, president Trenton Trust and Safe Deposit Company; A. M. Young, general manager of the Kings County Electric Light and Power Company, of Brooklyn, N. Y.; John S. Bartlett, treasurer Electric Corporation, Malden, Mass., and Arthur J. Eddy, of Walker & Eddy, attorneys, Chicago.

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Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Build. ing, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED JANUARY 17, 1899.

617,714 Electric condenser; C. S. Bradley, Avon, N. Y.—A condenser composed of two conducting surfaces, separated from one another by a spacer or thread of insulating material wound or peripherally arranged to leave spaces between the several turns of the thread.

617,715 Enclosed electric switch; W. M. Brown, Johnstown, Pa.—A closed insulating vessel and a metal casing for the same, tapered passages in the opposite walls of the vessel and casing, a post passing through said vessel and fitting in said bearings, and a switch member carried by the central portion of said post.

617,726 Counting mechanism of electric supply motormeters; S. Evershed, London, Eng.

617,781 Ore crusher; C. Skinner, Chicago, Ill.

617,783 Electro-magnetic hone; T. R. Smith, Los Angeles, Cal.—A hone and an electro-magnet arranged with such relation to the hone that the lines of effective magnetic force through the hone are toward one pole of the magnet only.

617,793 Regulator for constant-current dynamos; J. J. Wood, Fort Wayne, Ind.

617,806 Electric igniter for explosive engines; F. E. Canda, New York, N. Y.—A speed-regulating mechanism for gas and oil engines, comprising a plurality of separate electrical igniting devices, adapted to ignite the charges at different periods in the stroke, and means for throwing the several igniting devices into and out of action at will.

617,837 Electric railway system; E. E. W. Reichel, Berlin, Germany—Consists of a plurality of motor cars in a single train, of motor controllers upon said cars, an indicator upon one of the motor cars, and means governed by the motor controller upon another car for operating said indicator.

617,838 Electro-magnet; Max Schieman, Dresden, Germany.

617,840 Lockout mechanism for party telephone lines; C. E. Scribner, Chicago, Ill.

617,842 Method of and means for deriving polyphase currents; H. A. Wagner, St. Louis, Mo.

617,853 Electric signaling; J. P. Coleman, Edgewood Park, N. J.—In a relay, the combination of front and rear contact points, an independently movable contact plate, an armature lever adapted by reverse movements to shift the contact plate against the front and rear contact points respectively, and magnets for shifting said lever.

617,854 Relay; J. P. Coleman, Edgewood Park, N. J.

617,858 Magneto circuit-closer; J. E. Fuller, New York, N. Y.

617,886 Electrolytic refining of copper; E. A. Smith, Anaconda, Mont.

617,890 Telautograph; G. S. Tiffany, Highland Park, Ill.—The method of transmitting messages which consists in transmuting the movements of the transmitting-pen into impulses of successively like polarity, transmuting these impulses by induction into pulsations of successively opposite polarity, and causing the receiving-pen to move a step under the influence of each of the latter pulsations.

617,891 617,892 Telautograph; G. S. Tiffany, Highland Park, Ill.

617,901 Apparatus for producing electric currents; M. C. Massie, Washington, D. C.—A Wheatstone bridge, means for repeatedly and alternately balancing and unbalancing the resistances of the branches of said bridge, and means for energizing the branches, whereby a current is produced in the bridge conductor.

617,908 Galvanic battery; C. T. Richmond, Cleveland, Ohio.

617,938 Electrical alarm matting; A. DeForest Risley, Richfield Springs, N. Y.

Walker Company's New Officers.

At the annual meeting of the stockholders of the Walker Company, held at its office in Jersey City, N. J., last week, the following board of directors was elected: Edwin S. Carpenter, W. A. Esselstyn, George W. Hebard, P. F. Kobbé, Charles A. Terry, B. H. Warren and William F. Zimmermann. The following officers were elected: B. H. Warren, president; P. F. Kobbé, first vice-president; George W. Hebard, second vice-president; Edwin S. Carpenter, treasurer; Charles A Terry, secretary and assistant treasurer; J. H. Jones, assistant secretary; James G. Bennett, auditor; F. B. Brown, assistant auditor and cashier.

Simplex Friction Tape in Tin Boxes.

The Western Electric Company, of Chicago and New York, is furnishing its customers Simplex friction tape packed in tin boxes. The boxes are four and one fourth inches in diameter and one inch deep, and contain

CUT ONE-HALF SIZE—FAC-SIMILE TIN BOX CONTAINING TAPE.

one-half-pound rolls of tape carefully wrapped in oil paper. The tape is prepared with the greatest care, of high-grade materials, and either white or black tape is furnished. This method of packing tape has advantages which are readily appreciated. The tape is thoroughly protected from the drying-out effect due to the exposure to air, and is also protected from dirt. The box is of a convenient size to be carried by the wireman, and will supply him with a receptacle for the partially used roll which otherwise might be thrown loosely into the tool bag. It is convenient, always clean and economical, and contractors, central station managers and users of tape generally will find it to their advantage to order at least a sample lot.

Columbia Incandescent Lamp Company's Officers.

At the annual meeting of the Columbia Incandescent Lamp Company, of St. Louis, the following officers were elected: W. O. Garrison, president; A. C. Garrison, vice-president and treasurer; Geo. P. Rex, acting secretary.

Mr. W. O. Garrison, as heretofore, will act in an advisory capacity, and Mr. A. C. Garrison will retain the general management of the affairs of the company. Mr. Rex, who has been the company's Chicago manager up to this time, will assist in the office work.

Manhattan "L" Officials Interested in Chicago Sprague Installation.

During an interview which a representative of the ELECTRICAL REVIEW had with a prominent electrical engineer, who has been spending the past week in Chicago in connection with several large electrical deals, it was learned that two representatives of the Manhattan Elevated Railroad had been in Chicago studying the operation of the Sprague system as it is in practical use on the Chicago elevated.

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Kindred.... ...Interests

The Liverpool & London & Globe Insurance Company send out a very neat and convenient calendar from the company's New York office on William street.

Baker & Company, of Newark, N. J., the well known platinum dealers and refiners, are sending to their friends neat memorandum books with celluloid covers prominently displaying the national colors.

Shawmut Fuse Wire Company, Boston, Mass., have issued for New Year's distribution a comprehensive catalogue of fuse wire, fuse links, enclosed fuses, tablet boards and knife switches. The booklet contains much matter of general interest to electricians on the subject of fuses and their application, and also some interesting data relative to switchboard construction.

"Pencilings" is the title of a very interesting brochure issued by the Joseph Dixon Crucible Company, Jersey City, N. J., describing their extensive line of lead pencils for all purposes. The booklet is illustrated with handsome drawings, some of them in colors, showing what may be accomplished with American pencils made by American workmen out of American materials.

Mr. Stuart W. Wise is now in charge of a branch of the Manhattan General Electric Construction Company, of New York, which has been established in the John Hancock Building on Devonshire street, Boston. Mr. Wise will manage the New England sales of the new "Manhattan" arc lamps, which the company are now manufacturing for all direct and alternating currents.

The Western Electrical Supply Company, of St. Louis, have now arrangements perfected whereby they are able to offer the electrical field of the West, for the season of 1899, a most complete line of fan motor and electric ventilating apparatus of standard productions. This includes the "Weston" alternating fan motors for both ceiling and standard types, "Paragon" fan motors for direct current in all the various forms of desk and wall bracket design, and the "Standard" styles of ceiling fans for direct current. This apparatus, as will be evident to those who are familiar with the development in this branch of electrical manufacturing, represent an excellent line of electric ventilating equipment.

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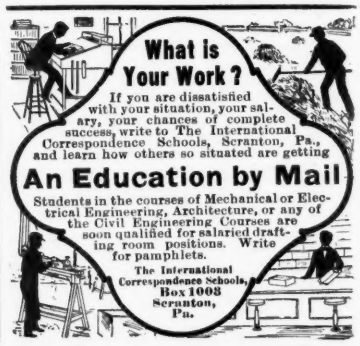
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